APPENDIX G

COMMENTS AND RESPONSES FOR
DRAFT HUMAN HEALTH RISK ASSESSMENT PROTOCOL
October 2, 2000

APPENDIX G-1

RESPONSES TO COMMENTS FROM UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF SOLID AND HAZARDOUS WASTE

(Seven Pages)

RESPONSES TO COMMENTS FROM UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF SOLID AND HAZARDOUS WASTE

1. **Comment.** For future submittals, please begin each section (e.g., Section 2.0 FACILITY CHARACTERIZATION) on a new page.

Response. Each section in the revised protocol will begin on a new page.

2. **Comment.** Please include text describing how the incremental risk for each agent campaign will be calculated.

Response. Text has been added to Section 7.0, Risk Characterization, describing how incremental risk for each agent campaign has been calculated.

3. **Comment.** p. 1, Section 1.0 Introduction. The Deseret Chemical Depot stockpile contains the sulfur mustard blister agents of H (bis(2-chloroethyl)sulfide), HD (distilled H), and HT (a mixture of HD and T (bis 2 (chloroethylthioethyl)ether CAS 6392-89-8)). Please consider defining the term "sulfur mustard" as chemical agents H, HD, and HT. All three chemical agents comprise the sulfur mustard stockpile at DCD and defining a single term may help to avoid confusion regarding the unintentional inclusion or exclusion of the different types of sulfur mustard.

Response. The definition of "sulfur mustard" has been added to Section 1.0.

4. **Comment.** p. 7, Section 2.1.3.1 Tooele Chemical Agent Disposal Facility. Please include a discussion of the uncertainties associated with the duration of operation of the TOCDF. The 2004 estimate was the initial target date and does not appear to be feasible based on the observed rate of progress. *A Schedule Risk Assessment of the Chemical Stockpile Disposal Project* (Arthur Andersen LLP, 1998) provides median and 95th percentile estimates (this report has been provided to Tetra Tech). The discussion should also include how the risk assessment will incorporate this information. The Division of Solid and Hazardous Waste (DSHW) has recommended to Tetra Tech to assume that the GB campaign will take 59 percent of the total time for all campaigns, the VX campaign will take 19 percent of the time, and sulfur mustard will take 22 percent based on the schedule in Arthur Andersen (1998). The DSHW recommended that the total time of operation be assumed to be from 1996 to 2009 or 13 years. Thirteen years would be an appropriate assumption because 1) the RCRA permit would have to be renewed in 2009 and 2) the 95th percentile estimate from Arthur Andersen (1998) is 10.7 years for operations and 12 years when closure is included. Assuming 13 years may violate conservation of mass for metals emissions because there is a finite quantity of metals in the munitions whether processing takes five or 15 years. However, organic emissions (i.e., dioxins) are expected to be the risk-drivers and these may be emitted for the duration of operations.

Response. A discussion of the uncertainty associated with the time period of combustion, and how it will be incorporated into the risk assessment, has been added to Section 2.1.3.1.

5. **Comment.** p. 9, Section 2.1.3.2 Chemical Agent Munitions Disposal System. Hydrolysate is misspelled "hydrolysite".

Response. This misspelling has been corrected.

6. **Comment.** p. 9, Section 2.1.3.2 Chemical Agent Munitions Disposal System. Please include a discussion of the expected operating duration for CAMDS. Unlike the TOCDF, the expected

operating duration of CAMDS is less well defined. CAMDS RCRA operating permit would have to be renewed in 2009 and a ten-year duration of operations could be based on the RCRA permit duration. In general, CAMDS is not expected to operate substantially longer (e.g., more than five years) than the TOCDF.

Response. Section 2.1.3.2 has been revised to include a discussion on the basis and assumptions about the expected operating duration for CAMDS.

7. **Comment.** p. 12, Section 2.2 Emission Sources and Available Stack Gas Emission Data. Permissible is misspelled "permissable".

Response. This misspelling has been corrected.

8. **Comment.** p. 12, Section 2.2.1 TOCDF Emission Sources. Disassembling is misspelled "disassembing".

Response. This misspelling has been corrected.

9. **Comment.** p. 12, Section 2.2.1 TOCDF Emission Sources. Please correct the text to indicate that the operations of the TOCDF DFS and MPF occur independently and concurrently, i.e., delete the clause.

Response. The clause "however, the MPF and the DFS do not typically operate at the same time" has been removed from the text in Section 2.2.1.

10. **Comment.** p. 12, Section 2.2.1 TOCDF Emission Sources. Please check if the following sentence should read "was <u>not</u> conducted". "Therefore, an evaluation of potential fugitive emission sources separate from the evaluation of the TOCDF HVAC was conducted".

Response. The sentence is phrased incorrectly, as identified in the comment. The sentence has been revised as recommended.

11. **Comment.** p. 12, Section 2.2.1 TOCDF Emission Sources. Please correct the text from "PAS byproducts (brines) are treated in the brine reduction area (BRA) to "PAS byproducts (brines) may be treated in the brine reduction area (BRA)."

Response. Section 2.2.1 has been revised as suggested in the comment.

12. **Comment.** p. 17, Table 2-6a. TOCDF Deactivation Furnace Permitted Waste Feeds and Feed Rate Limits. Please correct the listed maximum feed rate of <u>7.33.4</u> lbs/hr of propellant for VX Rockets.

Response. Table 2-6a has been revised to include the correct information.

13. **Comment.** p. 23, Section 2.2.1.1 TOCDF Liquid Incinerators 1 and 2. Please revise the syntax to indicate that spent decontamination solution is sodium hypochlorite or sodium hydroxide.

Response. Section 2.2.1.1 has been revised as suggested.

14. **Comment.** p. 24, Section 2.2.1.2 TOCDF Metal Parts Furnace. In the second paragraph, rockets are erroneously described as being fed to the MPF. The sentence would be accurate if "munition body" were substituted for rocket.

Response. The second paragraph in Section 2.2.1.2 has been revised as suggested in the comment.

15. **Comment.** p. 27, Section 2.2.1.3 TOCDF Deactivation Furnace. Please delete the inaccurate reference to a slagging afterburner for the DFS.

Response. The reference to a slagging afterburner has been deleted from Section 2.2.1.3.

16 **Comment.** p. 34, Section 2.2.3 Hazardous Waste Storage Area Emission Sources. In the electronic copy, "on-site container" is in red font. Please eliminate any spurious colored fonts from electronic deliverables.

Response. All colored fonts have been removed from the text.

17. **Comment.** Table 2-13 Summary of COPC Selection Process. In the electronic copy, the check marks appear as a [. Please coordinate with the DSHW project lead to determine a mutually compatible character.

Response. This issue has been resolved with the DSHW project technical lead.

18. **Comment.** p. 55, Section 2.4.1.1 TOCDF LIC1 GB Emissions. Please also include the LIC 1 miniburn conducted in November 1998 as a source of emissions data for both LIC 1 and LIC 2.

Response. Section 2.4.1.1 of the draft protocol has been revised to include the information about the LIC1 miniburn and its use as the source of emissions data for LIC1 and LIC2. Appendix A, which presents emission rates for TOCDF, was also revised in accordance with the comment.

19 **Comment.** Table 2-14 Methodology for Emission Rate Calculations and Extrapolations. The word congener is misspelled "cogener".

Response. The misspelling has been corrected in Table 2-14.

20. **Comment.** Table 2-14 Methodology for Emission Rate Calculations and Extrapolations. In the notes, the definition of the acronym GB is misspelled. Also, please check the spelling on the acronyms page in the beginning of the report.

Response. The spelling of GB in Table 2-14 and in the acronym list has been corrected. The revised draft protocol spells GB as Isopropyl methylphosphonofluoridate.

21. **Comment.** p. 60, Section 2.4.1.4 TOCDF DFS GB Emissions. Please clarify the text to indicate that the DSHW rejected the results 1998 trial burn. In the 1999 TOCDF DFS GB trial burn, the

energetics nitroglycerine and 2,4,6-trinitrotoluene were POHCs. RDX is potentially a PIC but was not a target analyte in 1999 because of the extraction method for NG and TNT precluded analysis for RDX. The DSHW recommended to Tetra Tech that the (rejected) TOCDF DFS GB 1998 trial burn results would be the best estimate of potential RDX emissions. The NG and TNT emissions should be based on the approved 1999 TOCDF GB DFS trial burn (see specific comment 13 from the DSHW on the June 2000 draft of the HHRAP and the February 22, 2000 letter to Ms. McDonald). This comment also impacts Section 2.4.2.10 CAMDS DFS GB Emissions because the emissions were extrapolated from the TOCDF DFS GB trial burn and the emission spreadsheets for the TOCDF DFS GB trial burn emissions.

Response. Sections 2.4.1.4 and 2.4.10 have been revised to clearly indicate that (1) DSHW rejected the January 1997 trial burn test data for the TOCDF DFS (the trial burn report is referenced as EG&G [1998a] in the draft protocol), but that the RDX data from the January 1997 trial burn test were used to estimate potential RDX emissions because it was not a target analyte during the November 1998 trial burn test (the trial burn report is referenced as EG&G [1999a] in the draft protocol). All other emission rate calculations for the TOCDF DFS GB and CAMDS DFS GB scenarios are based on November 1998 trial burn test data (EG&G 1999a). Appendix A has been revised as well.

22. **Comment.** p. 71 Section 2.4.2.5. TOCDF MPF VX Emissions. Extrapolating from CAMDS flow rates to TOCDF flow rates using equation 2-8 (which was used in Table A-8) would result in an extrapolation factor of 1.85 to 1.94.

Response. The text in Section 2.4.2.5 has been revised to indicate that the extrapolation factor ranges from 1.85 to 1.94.

23. **Comment.** p. 73 Section 2.4.2.7 TOCDF DFS VX Emissions. Please include PCB emissions data for the TOCDF DFS processing VX. CAMDS is the source of the emissions data, but contrary to the text in this section, PCBs don't appear to have been a target analyte. For estimating PCB emission rates for the TOCDF DFS processing VX, the TOCDF DFS GB trial burn may be the best source because the PCB component of the waste stream (M55 rocket shipping and firing tubes) is the same.

Response. These data will be used to estimate PCB emission rates for the TOCDF DFS processing VX. Section 2.4.2.5 of the draft protocol has been revised to include the correct information.

24. **Comment.** p. 77. Section 2.4.3.1 TOCDF BRA Emissions. The brine reduction area stack is not required to have chemical agent monitors because the brine must be agent-free (defined by a detection limit) prior to processing. The risk assessment should not assume that chemical agent is released from the brine reduction area stack.

Response. Section 2.4.3.1 of the text will be revised. No agent evaluation for the TOCDF BRA will be performed.

25. **Comment.** p. 81, Section 2.4.5.1 Maximum Emission Rate Correction. The 95 percent UCL should be defined as 95 percent upper confidence limit of the mean.

Response. The text in Section 2.4.5.1 has been revised accordingly.

26. **Comment.** p. 82, Section 2.4.5.2 Total Organic Emission Rate Correction. Please correct the periods at the end of the following sentence: "Therefore, only the most recent JACADS and TOCDF data have complete TOE data that were collected following U.S. EPA (1996b guidance..."

Response. The punctuation has been corrected.

27. **Comment.** p. 86, Section 2.4.6.1 Polychlorinated Dibenzo(p)dioxin and Polychlorinated Dibenzofuran Emissions. The last sentence of the section indicates that TEFs are the same for all congeners within an isomer group. This statement is correct with the exception of the two 2,3,7,8-isomers of pentachlorinated dibenzofurans (listed with different acronyms in Table 2-15).

Response. The revised text in Section 2.4.6.1 states that the TEF value for 2,3,4,7,8-pentachlorodibenzofuran (the more conservative value) will be used to model the 2,3,7,8-TCDD TEQ value for total pentachlorodibenzofurans.

28. **Comment.** p. 91, Section 2.4.6.4 Lead. The target blood concentration should be deciliter, and not decaliter.

Response. The text has been revised accordingly.

29. **Comment.** p. 94, Section 3.1 Overview of Air Modeling Procedures. Two bullets are in red font in the electronic copy. Please eliminate all spurious colored fonts from electronic deliverables.

Response. The redlining has been removed.

30. **Comment.** p. 107, Table 4-1 Exposure Pathways and Scenarios for the TOCDF Human Health Risk Assessment. Please consider an alternative way to describe the acute risk evaluation to be consistent with the text description in Section 4.2.2.6. Acute risk evaluates inhalation exposures only. The table indicates that ingestion pathways (e.g., ingestion of beef) will be evaluated for acute exposures.

Response. Table 4-1 has been revised to indicate that acute risk will be evaluated for inhalation only.

31. **Comment.** p. 120, Table 5-1 Exposure Parameters for Health Risk Assessment. USEPA (1998a) recommends a default exposure frequency of 350 days per year for residential and rancher scenarios (7 days per year and 365 days/year are listed in addition to 350 days/year).

Response. The default exposure frequency for the residential and rancher scenarios has been changed to 350 days per year.

32. **Comment.** p. 120, Table 5-1 Exposure Parameters for Health Risk Assessment. For the resident and subsistence rancher, the inhalation rate is incorrectly titled ingestion rate.

Response. Table 5-1 has been revised accordingly.

33. **Comment.** p. 120, Table 5-1 Exposure Parameters for Health Risk Assessment. Please correct the ingestion rate for homegrown vegetable ingestion by the subsistence rancher (1.0 (unitless) is listed).

Response. The U.S. EPA default ingestion rates for homegrown produce have been added to Table 5-1.

34. **Comment.** p. 120, Table 5-1 Exposure Parameters for Health Risk Assessment. For the recreationist, should the ingestion rate units be mL per day instead of mL per hour? Ultimately, the units need to be on a per day basis because the exposure frequency is days/year.

Response. U.S. EPA's *Superfund Exposure Assessment Manual* recommends 50 milliliters per hour as an incidental water ingestion rate while swimming. Based on a swimming frequency of 2 hours per day, the value has been converted to 0.1 liters per day.

35. **Comment.** p. 133, Section 7.2 Methods for Calculating Noncancer Hazards. In the last paragraph of the section, further evaluation of hazard indices exceeding the target level is discussed. "This might occur because….(2) the sum of several COPC-specific HQs, each less than the target hazard level, is greater than one." The target level for most hazard indices is 0.25, so the sentence should be revised to be less specific. For instance, the sentence could be revised as follows: (2) the sum of several COPC-specific HQs exceed the target hazard level but the HQ for each COPC is less than the target level.

Response. The sentence has been revised as suggested.

36. **Comment.** p. 136, Section 7.3.2 Limitations. The second bullet states that the data are not presented on a body weight basis. Please identify to whom (mother or infant) this limitation applies. The infant body weight is included in the dose estimate but no body weight is included for estimating the concentration of dioxin in the mother's milk. If the limitation is based on the lack of consideration of the mother's body weight, then the limitation will not affect infant sensitivity.

Response. The second bullet in Section 7.3.2 has been removed and Section 7.3.2 has been revised accordingly.

37. **Comment.** p. 138, Section 7.5 Target Levels. Per the DSHW comments on the previous draft of the HHRAP, the target level set by the DSHW for acute inhalation exposures is one. Please revise the last sentence of Section 7.4 and the target levels presented in tabular form.

Response. The text in Section 7.4 and the target levels in Section 7.5 have been revised to indicate a target level of one for acute inhalation exposures.

38. **Comment.** Section 9.0 Uncertainties. Please include a description of the sensitivity analysis that will be conducted as required by the work order on the duration of operations assumption.

Response. The description of the sensitivity analysis on the time period of operations has been added to Section 9.0. To determine the risk trends or sensitivities associated with time period of operations assumptions, changes in total risk at 1, 25, 50, and 100 years will be determined for all exposure pathways being evaluated in the risk assessment.

39. **Comment.** Appendix A. The TOCDF LIC GB metals emissions should include the results of the LIC 1 miniburn. These results should be considered for both TOCDF LICs because GB can be processed in either furnace.

Response. Appendix A of the draft protocol has been revised to include the results of the TOCDF GB LIC1 miniburn, which were used to develop GB emissions rates for the TOCDF LIC1 and LIC2. Please also see the response to Comment 18 above.

40. **Comment.** Table A-6. TOCDF LIC1 HD data. The Feed Scaled Emission Rates for TOCDF dioxins and furans have two unlabelled columns (to the right of the column labeled IRAP-H Emission Rate).

Response. The two unlabelled columns in Table A-6 have been labeled.

41. **Comment.** The response to comment 34 on the June 2, 2000 draft of the HHRAP was not implemented. Specifically, the boolean for GB for the TOCDF MPF GB trial burn should be non-detect. All spreadsheets should explicitly note that the emission rates for the chemical agents are based on the RCRA permit limits; chemical agent has not been detected during any trial burn.

Response. The appropriate sections of text and the appendices have been revised to include the correct information.

APPENDIX G-2

RESPONSES TO COMMENTS FROM DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION

(17 Pages)

RESPONSES TO COMMENTS FROM THE DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION

The Department of the Army Program Manager for Chemical Demilitarization (PMCD) submitted three sets of comments to DSHW on November 8, 2000. The comments were submitted by Michael J. Rowe (EG&G Defense Materials), J. David Jackson (TOCDF Site Project Manager), and J.K. Oliver (Civilian Executive Assistant), PMCD, Aberdeen Proving Ground, Maryland 21010-5401. Attachment B-1 includes responses to comments prepared by the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). Attachment B-2 includes responses to comments prepared by EG&G Defense Materials (contractor operator of Tooele Chemical Demilitarization Facility [TOCDF]), and Attachment B-3 provides comments prepared by the TOCDF field office.

USACHPPM

1. **Comment.** Page 27, Section 2.2.1.3, Last Paragraph, P. Galusky, USACHPPM
TOCDF Deactivation Furnace

Comment: The last paragraph ("Unlike the JACADS and TOCDF MPF…" focuses on the MPF while it is within the DFS section. Although information is not incorrect, it appears to be out of place.

Recommendation: Reword or move to MPF section.

Response. Section 2.2.1.3 has been revised in accordance with the recommendation.

2. **Comment.** Page 33, Section 2.2.2.2, P. Galusky, USACHPPM
CAMDS Liquid Incinerator

Comment: It is unclear why the CAMDS LIC is not to be evaluated merely because of the simultaneous operation issue. Emissions data from other sources is commonly used to fill data gaps. There must, therefore, be an inherent assumption that LIC emissions will be equal to or less than the MPF, since only the MPF is to be characterized. The LIC may feed 300 lbs/hr of agent and the MPF may feed only 130 lbs/hr of agent. Certain emissions could be under-characterized. Also, the more detailed discussion in Section 2.4 (as referenced) is not present.

Recommendation: Reconsider evaluation of LIC and provide additional detail.

Response. Although the factual information presented in the comment is correct, a modification to the proposed methodology is not warranted. First, even though the use of MPF emission rate data to represent both the LIC and MPF may underestimate certain emissions at this time due to the feed rate issue identified in the comment, the MPF emission rates that will be used to complete the risk assessment process at this time do not require the use of data extrapolation procedures. Second, due to the type of combustion in each system—in the MPF, the chemical agent is evaporated in the primary chamber and combusted in the secondary chamber, whereas the chemical agent is the fuel for the LIC primary chamber—more products of incomplete combustion are expected to be generated in the MPF. Third, higher emission rates for dioxins and furans (which are anticipated to drive the risk assessment), have been measured in the MPFs at TOCDF and JACADS, as compared to the LICs at these facilities during trial burn tests for the same agent campaigns. Fourth, the risk results for the TOCDF MPF and LICs will be compared to ensure that the risk from the MPF is higher than the risk from the LIC for all agent campaigns to further validate this approach. Finally, once a trial burn test of the CAMDS LIC has been

completed, the actual emission rates will be compared to the surrogate MPF rates to ensure that the emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated. Section 2.2.2.2 of the draft protocol has been revised to (1) include the information presented and (2) further explain the proposed methodology.

3. Comment. Page 65, Equations 2-5 through 2-8, P. Galusky, USACHPPM

Comment: It is not understood why the stack gas flow rate adjustments are used for scaling when characterizing emissions using trial bum data from other sites. Excess air resulting in higher stack flows does not necessarily result in higher mass emission rates. Pollution control equipment is designed to accommodate the amount of incinerator off-gas, and control equipment efficiencies should be comparable. Higher volumetric flow rates could result in lower residence times, however, other variables such as afterburner volume are just as critical and these were not taken into consideration. Additionally, afterburner residence time differences would impact organic emissions, but would not impact metals emissions.

The CAMDS MPF and LIC share the same PAS. This Center (formerly Army Environmental Hygiene Agency) conducted testing at the CAMDS LIC in 1989. During this testing, the PAS could not be operated with only the LIC online. The MPF was opened to allow additional ambient air into the common PAS so it could be operated properly. This higher stack flow rate did not result in higher mass emissions from the LIC, however, would greatly bias a characterization using the stack gas flow rate scaling.

The TOCDF feeds about $1/7^{th}$ the HD as compared to the feed rate during the JACADS testing, yet stack flows are nearly identical. Emissions are not likely to be at the same level as the JACADS testing, but the characterization with stack gas flow adjustments would do just that.

Recommendation: Although this is one of the most difficult and most uncertain areas of the risk assessment, reconsider use of stack gas flow rate adjustments as presented. If use is continued, please investigate flow differences more thoroughly and provide supporting detail of key issues such as ambient air infiltration as necessary.

Response. This comment addresses the use of COPC emission rates calculated using stack gas flow rate extrapolations. We agree with the potential impacts of the examples cited, and have revised Section 2.4.2 of the draft protocol to include a detailed description of the basis for the extrapolation methods used. Consistent methods of extrapolating emission rates based upon both feed rate and stack gas flow rates were used for all scenarios, and the highest calculated emission rate between the two methods was chosen for use in the risk assessment. Once a trial burn test has been completed for the scenarios where extrapolation was used, the actual emission rates will be compared to the surrogate rates to ensure that emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated.

4. **Comment.** Page 80, Section 2.4.5, Last Paragraph, P. Galusky, USACHPPM
Methodology for Emission Rate Correction Factors

Comment: The statement "U.S. EPA recommends that if COPCs are detected in the blank samples, the sample should be quantified at the COPC concentration in the blank sample if the detected blank concentration is 5 times greater than the detected stack gas concentration" does not actually reflect U.S. EPA guidance as referenced. U.S. EPA guidance states "If the concentration in a sample is less than five times the blank concentration, then the compound is treated as a non-detect in that particular sample."

Recommendation: Reword and revisit applicability. As presented in this protocol, the stack gas detections would be marked up because of contamination. As presented in U.S. EPA guidance, the stack gas detections would be marked down because of contamination.

Response. Stack gas COPC emission rates (uncorrected for blank contamination) were used for all emission rate calculations because this is the only data that has been presented in the trial burn test reports. Section 2.4.5 of the draft protocol has been revised to (1) clearly reflect U.S. EPA guidance and (2) include a complete explanation for the use of uncorrected data. In the future, blank-corrected emission rate data may be presented in trial burn reports. If so, this data may be used (once the trial burn reports are approved by DSHW) to complete a revised risk assessment. However, both corrected and uncorrected emission rates will need to be presented and used to complete the risk assessment, and the results presented for comparison, in accordance with U.S. EPA guidance (cited as U.S. EPA 1998a in the draft protocol).

5. **Comment.** Page 84, Section 2.4.5.4, P. Galusky, USACHPPM
Metal and Chlorine Emission Rate Correction

Comment: The "(A.T. Kearney, 1996)" reference which immediately follows the "*screening risk assessment at the Anniston Army Depot Chemical Demilitarization Facility"* citation is misleading, since USACHPPM performed that assessment.

Recommendation: Move the "(A.T. Kearney, 1996) " reference immediately after the "TOCDF *Screening Risk Assessment*" in same sentence as intended.

Response. The location of the reference has been moved as recommended in the comment.

6. **Comment.** Page 94, Section 3.2.3, B. Gaborek, USACHPPM
Watersheds

Comment: This section implies that simply by comparing emissions, one can determine what watersheds will produce the highest water body and fish concentrations. From this reviewer's experience, watershed area and water body volumetric flow rates, in addition to emissions, also influence water body and fish concentrations.

Recommendation: Please expand this section to clarify if watershed characteristics, such as watershed area and water body volumetric flow rates, were considered when determining which water bodies to evaluate. If watershed characteristics were not included in the selection process, please re-evaluate to ensure that the water bodies that are assessed will be representative of potential exposures and that human health will be protected.

Response. Comment acknowledged. Rainbow reservoir (fisher scenario) and the SunTen, Inc., water ski pond (incidental ingestion of water) will be evaluated in addition to Rush Lake. The text in Sections 3.2.3, 4.1.2, and 4.2.2 has been revised accordingly. Please also see the responses to Comments 7 and 8.

7. **Comment.** Page 104, Section 4.1.2, B. Gaborek, USACHPPM
Water Bodies and Associated Watersheds

Comment: This section implies that the water-ski pond, SunTen Inc., will not be evaluated because air dispersion modeling indicates that the impact at Rush Lake is greater. As previously stated, some watershed characteristics also influence water concentrations, in addition to emissions.

Recommendation: Please expand this section to clarify if watershed characteristics were considered when determining that Rush Lake would have greater health impacts than SunTen Inc. If watershed characteristics were not considered, please re-evaluate to ensure that Rush Lake will be representative of potential exposures and that human health will be protected.

Response. Comment acknowledged. Incidental ingestion of surface water will be evaluated for the SunTen, Inc., water ski pond. The text in Section 4.1.2 has been revised accordingly. Please also see responses to Comment 6 and Comment 8.

8. **Comment.** Page 106, Section 4.2.2, B. Gaborek, USACHPPM
Exposure Scenarios to Be Evaluated

Comment: Earlier text indicated that Rainbow Reservoir might be opened to fishing sometime in the future. There is no discussion in this section or in the rest of the document indicating whether or not a fisher scenario will be evaluated. There is discussion in later sections, however, that the ingestion of milk from homegrown cows and ingestion of pork will be evaluated, even though these exposure pathways are currently incomplete.

Recommendation: Please consistently discuss and evaluate future exposure pathways that are currently not complete.

Response. The fisher will be evaluated as a potential future pathway for Rainbow Reservoir. The text in Sections 4.1.2 and 4.2.2 has been revised to indicate how the fisher will be evaluated. Please also see the response to Comment 6.

9. **Comment.** Page 107, Table 4- 1, B. Gaborek, USACBPPM
Exposure Pathways and Scenarios

Comment: The text in Section 4.2.2.1, Current-Future Resident Adult and Child, and the U.S. EPA's *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, July 1998*, both indicate that adult and child residents may be exposed to emissions via ingestion of homegrown produce. Table 4-1, however, indicates that this pathway will not be assessed.

Recommendation: Please correct Table 4-1 to indicate that the homegrown produce ingestion exposure pathway will be assessed for adult and child residents.

Response. Comment acknowledged. Table 4-1 has been revised in accordance with the recommendation.

10. **Comment.** Page 108, Table 4-2, B. Gaborek, USACHPPM
Potential Exposure Pathways

Comment: Table 4-2 indicates that inhalation and incidental ingestion of soil exposure pathways will not be evaluated for the recreationist because exposures are expected to be less than those to the resident. While that reviewer agrees that exposures to the recreationist via these two pathways will most likely be less than those to the resident, the resident is not being evaluated via the incidental surface water and fish ingestion pathways. Therefore, the recreationist may have a greater potential for adverse health impacts than the resident when all exposure pathways are totaled. In other words, the recreationist scenario is different enough from the resident scenario that all complete pathways for each should be evaluated.

Recommendation: To ensure that the recreationist is protected, please consider evaluating all completed exposure pathways, regardless of the relative contribution each pathway provides to the total risk or hazard.

Response. To remain consistent with current EPA guidance and to provide the flexibility for evaluating additional exposure pathways to the currently recommended exposure scenarios, risk results will be presented on a pathway-specific basis. This approach, where warranted, will allow for the inclusion of additional exposure pathways to the currently recommended exposure scenarios (i.e., resident, farmer and fisher), by post-processing or simply adding risk results for individual or combinations of other potential exposure pathways. For example, based on the identification of regional or site-specific exposure setting characteristics, potential risk impact to the recreational exposure scenario could be added to potential risk impacts for the residential exposure scenario to account for potential recreational activities associated with the resident.

11. **Comment.** Page 109, Table 4-2, B. Gaborek, USACHPPM
Potential Exposure Pathways

Comment: For the exposure to the recreationist via surface water, Table 4-2 indicates that dermal contact would be negligible. While this may indeed be a true statement, the justification for exclusion of this pathway is insufficient.

Recommendation: Please provide a more substantial justification for exclusion of the surface water dermal exposure pathway for the recreationist.

Response. U.S. EPA's protocol for performing health risk assessment for hazardous waste combustion units indicates that the dermal pathway contributes an insignificant amount of risk compared to the ingestion and inhalation pathways. U.S. EPA's protocol discusses this issue in Section 4.2 (Pages 4-12 and 4-13) and Section 6.2.4.3 (Page 6-12), which states that "U.S. EPA OSW does not typically recommend the use, in the evaluation of exposure scenarios, of the dermal water exposure pathway." U.S. EPA states that dermal absorption could be a possible exposure route "if the surface water body affected by the combustion unit emissions is used frequently." DSHW has indicated that the water bodies under evaluation are not used frequently by a recreationist because the summer is short.

Based on current U.S. EPA guidance, dermal exposure will not be evaluated. Table 4-2 and Section 4.2.2.3 have been revised to include justification for the exclusion of the dermal surface water pathway for the recreationist.

12. Comment. Page111, Table 4-2, B. Gaborek, USACHPPM
Potential Exposure Pathways

Comment: Each scenario presented within Table 4-2 combine different exposure pathways. It is this reviewer's opinion, that this difference warrants evaluation of the breast milk pathway for the infant of a recreationist and the infant of an on-site worker.

Recommendation: To ensure that the infant of a recreationist and the infant of an on-site worker are protected, please consider evaluating the breast milk pathway for these individuals.

Response. The comment recommends evaluating the breast milk pathway for the infant of a recreational adult and the infant of an on-site worker. To ensure that actual and potential exposure pathways are considered, recommended exposure pathways have been modified to include consideration of the breast milk exposure pathway for the on-site worker and recreational adult. Revisions to the draft protocol have been made in Table 4-2 and Sections 4.2.2.3 and 4.2.2.4.

13. Comment. Page 112, Section 4.2.2. 1, B. Gaborek, USACPPM
Current-Future Resident Adult and Child

Comment: The text in this section indicates that the ingestion of milk from homegrown cows and ingestion of homegrown pork will be evaluated for the adult and child resident. Tables 4-1 and 4-2, however, do not. In addition, the Section number in the last bullet should be 4.2.2.5 rather than 4.2.5.

Recommendation: Please correct this inconsistency and typographical error.

Response. The comment discusses that Section 4.2.2.1 incorrectly states that the ingestion of milk from homegrown cows and the ingestion of homegrown pork will be evaluated for the current-future resident. Section 4.2.2.1 has been revised to remove the evaluation of ingestion of milk from homegrown cows and ingestion of homegrown pork exposure pathways. The subsistence rancher exposure scenario takes into account exposures to residents in the assessment area that may ingest homegrown animal products.

14. Comment. Page 113, Section 4.2.2.2, B. Gaborek, USACHPPM
Current-Future Subsistence Rancher Adult and Child

Comment: Tables 4-1 and 4-2 indicate that the ingestion of milk from homegrown cows and ingestion of homegrown pork will be evaluated for the adult and child subsistence rancher. The text in this section, however, does not. In addition, the Section number in the last bullet should be 4.2.2.5 rather than 4.2.5.

Recommendation: Please correct this inconsistency and typographical error.

Response. We disagree with the comment. The comment states that Section 4.2.2.2 does not include the ingestion of milk from homegrown cows and ingestion of homegrown pork exposure pathways. Section 4.2.2.2 correctly states that the ingestion of meat, eggs, and milk will be evaluated in the risk assessment for the subsistence rancher. For further clarification, the text has been revised to discuss that the ingestion of milk from homegrown cows and that ingestion of homegrown pork does not currently occur in Tooele County. DSHW believes that pigs are fed non-local feed. These exposures will be evaluated as future potential pathways for the subsistence rancher. In addition, the section number in the last bullet has been revised in accordance with the comment.

15. **Comment.** Page 114, Section 4.2.2.3, B. Gaborek, USACHPPM
Current-Future Recreational Adult and Child

Comment: This section indicates that "impacts are highest at Rush Lake" from recreational activities' exposures. No justification is provided, however, supporting this conclusion.

Recommendation: Please provide a justification for the conclusion that impacts are highest at Rush Lake and that evaluation of this water body "will be protective of recreational activities occurring at other water bodies surrounding DCD."

Response. In addition to Rush Lake, the fisher scenario will be evaluated as a potential future pathway for Rainbow Reservoir, and incidental ingestion of surface water will be evaluated for the SunTen, Inc., water ski pond. The text in Section 4.2.2.3 (and elsewhere) has been revised accordingly. Please also see responses to Comments 6, 7, 8, 10, and 11.

16. **Comment 16.** Page 115, Section 4.2.2.5, B. Gaborek, USACHPPM
Breast Milk Pathway

Comment: Each scenario that will be evaluated in the risk assessment combine different exposure pathways. It is this reviewer's opinion, that this difference warrants evaluation of the breast milk pathway for the infant of a recreationist and the infant of an on-site worker.

Recommendation: To ensure that the infant of a recreationist and the infant of an on-site worker are protected, please consider evaluating the breast milk pathway for these individuals.

Response. Please refer to the response under Comment No. 12.

17. **Comment.** Pages 117 and 118, Sections 4.3.3 and 4.36, B. Gaborek, USACHPPM
Surface Water Concentrations and Fish Concentrations

Comment: There appear to be typographical errors in these sections. In the second sentences of both sections, "elemental mercury" should be replaced with methyl mercury."

Recommendation: Please make the corrections.

Response. The comment is correct. Sections 4.3.3 and 4.3.6 have been revised to replace “elemental mercury” with “methyl mercury.”

18. **Comment.** Pages 120 and 121, Table 5-1, B. Gaborek, USACHPPM Exposure Parameters

Comment: Table 5-1 appears to have numerous typographical errors, inconsistencies with guidance and/or appendices, and missing parameters and exposure pathways. For example, what is identified as "ingestion" rate under inhalation of ambient air for the resident and subsistence rancher, should be "inhalation" rate. According to U.S. EPA's *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, July 1998*, the surface soil ingestion rate for an adult and a child is 0.05 g/day and 0.10 g/day, respectively, not 0. I g/d and 0.2 g/d. Likewise, the surface soil exposure frequency is 350 d/y, not 7 d/y. In fact, the exposure frequency for all the exposure pathways, except perhaps incidental ingestion from swimming, is listed in U.S. EPA guidance as 350 d/y. If the intended exposure frequency is indeed 7 d/y for those pathways for which it is currently listed, this reviewer recommends that this parameter be reconsidered in all cases except incidental ingestion from swimming. In addition, the table does not include any of the exposure parameters for the ingestion of homegrown produce by the resident. Some of the homegrown produce parameters are listed for the subsistence rancher, but they appear to be incorrect. Finally, the exposure duration is not included for any of the scenarios, and the ingestion rate of fish for the recreationist should be in units of "g/kg-d FW" instead of "g FW/day."

Recommendation: Please carefully review Table 5-1 and make all appropriate corrections. If a recommended parameter is different than the U.S. EPA's *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, July 1998,* please also provide the justification for the deviation.

Response. Comment acknowledged. Table 5-1 has been revised in accordance with the comment.

19. **Comment.** Page 124, Section 6. 1, B. Gaborek USACHPPM
Toxicity Values for Carcinogenic COPCs

Comment: Isn't a Group E carcinogen defined as a chemical for which there is *no* evidence of *carcinogenicitv* in humans, rather than as a chemical for which there is evidence of noncarcinogenicity?

Recommendation: Please review the definition for a Group E carcinogen, and make appropriate corrections.

Response. We agree with the comment. Section 6.1 has been revised accordingly.

20. **Comment.** Page 126, Section 6.3, B. Gaborek, USACHPPM
Toxicity Values for Chemical Warfare Agents

Comment: The USACHPPM 1999 reference is not listed in the reference section. In addition, USACHPPM has completed its review of the Subcommittee (Subcommittee) on Chronic Reference Doses for Selected Chemical Warfare Agent's comments, and released a memorandum, dated 16 February 2000, to the Office of The Surgeon General (OTSG) recommending chronic toxicological criteria. This memorandum is provided as an Attachment.

Recommendation: Please include USACHPPM 1999 in the reference section and revise text in this section to update the status of USACHPPM's review of the Subcommittee's comments.

Response. Thank you for providing the memorandum. Section 6.3 has been revised to indicate that the toxicity values recommended by USACHPPM will be used to characterize the toxicity of GB, VX, and HD.

21. **Comment.** Page 128, Table 6-1, B. Gaborek, USACHPPM
Toxicity Values for Chemical Warfare Agents

Comment: Table 6-1 includes several typographic errors. For example, the units for inhalation unit risk should be "$(\mu g/m^3)^{-1}$" instead of "$\mu g/M^3$" the oral RfD for HD should be "7.OE-06" instead of "7.0-E-06," and under footnote "b," "Public" should be changed to "Population." On a technical note, the USACHPPM recently released the document entitled, *Evaluation of Airborne Exposure Limits for Sulfur Mustard: Occupational and General Population Exposure Criteria*, for external review. This document recommends a General Population Exposure Limit for HD of 2E-05 mg/m3 instead of IE-04 mg/m3, which translates to an Inhalation RfD of 6E-06 mg/kg-d rather than 3E-05 mg/kg-d. It can be provided upon your request. In addition, footnote "a" could be updated with the more recent OTSG memorandum that is provided as an Attachment.

Recommendation: Please make typographical corrections, and revise the inhalation RfD for HD and footnote "a" with the updated information.

Response. The typographical errors have been corrected, and the table has been updated in accordance with the new information. The information provided by the Army indicates that the proposed change to the General Population Exposure Limit for HD is acceptable because the value was derived in accordance with current U.S. EPA methodology.

22. **Comment.** Page 139, Section 7.5, B. Gaborek, USACHPPM
Target Levels

Comment: In the fourth paragraph of this section, it is stated that "the target level for acute inhalation exposures is a HI of one," which is inconsistent with the first paragraph of this section that indicates that the target level is "To be determined." In addition, the target level for noncarcinogenic PCDD and PCDF exposures appears to be inconsistent with the target levels listed in the first paragraph. To the best of this reviewer's knowledge, the 1 pg/kg-day value listed for adults and the 60 pg/kg-day value listed for nursing infants, represent the lower end of the range of background exposure, not 10% of background exposure.

Recommendation: Please correct the inconsistency relative to the acute inhalation exposure target level and investigate the source of the noncarcinogenic PCDD and PCDF target levels, making appropriate corrections to the text.

Response. Section 7.5 has been revised to specify the target level for acute inhalation exposures as 0.1 pg/kg-day for adults and 6 pg/kg-day for nursing infants. This represents 10 percent of background exposure.

23. **Comment.** Page 142, Section 9.2, B. Gaborek, USACHPPM
Types of Uncertainty

Comment: The meaning of the last sentence in this section is unclear.

Recommendation: Please clarify what is meant by the last sentence in this section.

Response. U.S. EPA's protocol for health risk assessments for hazardous waste combustion facilities is the source of the statement. We agree that it may be confusing. Upon further review of this section, we believe that the statement adds no substance and doesn't change the meaning or context of this discussion on uncertainty. Therefore, the sentence has been removed from the text.

24. **Comment.** Appendix C, Tables C-2 and C-3, P. Galusky, USACHPPM

Comment: As calculated, the "47 dscm/min" and "7.6 dscm/min" stack gas flow rates have incorrect units. The numerical values are correct in units of "dscm/s". Subsequent agent emission rates (g/s) presented in table are 60 times lower as a result. Additionally, "2.2 Stack diameter" in Table C-2 has no units provided.

Recommendation: Make correction and ensure other calculations/tables reflect the corrections.

Response. Appendix C of the draft protocol has been revised to include the correct values.

25. **Comment.** Appendix C, Table C-3, P. Galusky, USACHPPM

Comment: The HD emission rate (g/s) presented in table is incorrect. It is identical to the VX and GB emission rate even though stack concentration (mg/m3) of HD is 100 times lower than others.

Recommendation: Make correction and ensure other calculations/tables reflect the corrections.

Response. Appendix C of the draft protocol has been revised to include the correct values.

EG&G Defense Materials

General Comments

1. **General Comment.** There are tables presenting facility comparative incinerator engineering data for the DFS and MPF, but there is no comparable table for the LICs. A comparative table for the LICs should be included since scaled emission rates for the TOCDF LICs are based on either exhaust gas flow or agent feed rates.

Response. The draft protocol did not include a comparison table of LIC engineering data because (1) only JACADS data are extrapolated to TOCDF data (the CAMDS LIC was not evaluated) and (2) engineering data regarding the JACADS LIC was not available in the trial burn reports reviewed or readily available on-line. If these data can be provided, a comparison table for LIC engineering data can be incorporated into the draft protocol. Please also see our response to EG&G General Comment 3.

2. **General Comment.** The time frame of operations and the proportioning of the time frame by agent campaign is not discussed.

Response. Discussion on the time frame of operations and the proportioning of it by agent campaign has been added to Section 2, which has been modified in accordance with DSHW comment no. 4 (see Attachment A). Sections 2.0 and 8.0 of the draft protocol have been revised to address this issue.

3. **General Comment.** The feed rate of the Chemicals of Potential Concern (COPC) are based on either incinerator specific trial burn data or scaled data based on a comparison of the waste feed or exhaust gas flow rates of incinerators of the same type. The values used to scale the data are not presented on the spreadsheet found in the appendices. The scaling method is discussed in Section 2 of the protocol. It would be helpful to include a table that presents the values associated with each incinerator (i.e., exhaust gas flow rates and waste feed rates) that were used to perform the scaling. Although some of the values needed are presented in various tables found throughout Section 2, a single table presenting this information, or a spreadsheet added to the appropriate appendices, would be helpful to any reviewer trying to check, or recreate the scaled COPC emission rates that are presented in the spreadsheets of the appendices.

Response. A table summarizing the stack gas flow rate and feed rate values used to calculate the extrapolation factors has been added to Section 2.4.2 of the draft protocol. Electronic copies of the Microsoft Excel® spreadsheets used to calculate the emission rate data included in Appendixes A, B, and C are also available from the DSHW.

4. **General Comment.** The assumption that CAMDS will operate the same length of time as the TOCDF is overly conservative. This assumption essentially doubles the number of items in the DCD chemical agent stockpile that require treatment in the MPF and DFS (i.e., the stockpile of projectiles and rockets is made twice as large as it actually is by this assumption). The role of CAMDS in processing munitions from the DCD chemical stockpile is limited.

Overestimating emissions for some sources for the purpose of adding conservatism to the HRA causes the emission estimates for other sources (i.e., the more active sources) to be biased lower than they could be. As an example, if the metal emissions for CAMDS were made less conservative by basing CAMDS operations on a time frame that is more realistic than full time operation of the DFS and MPF over the same time period as the TOCDF, then the modeled metal emission rates for TOCDF could be increased to at least be equivalent to those allowed for under the recently promulgated Clean Air Act (CAA) Maximum Achievable Control Technology (MACT) regulations (40 CFR 63, Subpart EEE).

Response. This comment discusses two separate issues. The first issue examines the operating period assumptions used to calculate the exposure durations for the risk assessment. Please see DSHW Comment 4 for more information regarding this comment. Sections 2.0 and 8.0 have been revised to include a discussion detailing operating duration assumptions, campaign duration assumptions, and permit duration assumptions.

The second issue introduces the concept of completing the risk assessment process using MACT stack gas concentration levels. Documentation of compliance with the MACT standards for hazardous waste combustors (HWC) is not required to be included in the facility operating record until September 30, 2002. Notification of compliance with the HWC MACT standards (following completion of a HWC MACT comprehensive performance test) is not required until August 30, 2003. The draft protocol has been developed to satisfy the requirements of the current TOCDF and CAMDS RCRA permits. This issue will be reviewed during the MACT HWC permitting process.

5. **General Comment.** The TOCDF Brine Reduction Area (BRA) Compliance Test results were not approved by DSHW because the particulate emissions exceeded those established by the newly promulgated MACT regulations (0.015 grains/dry standard cubic foot). The only way the BRA will be able to be used is if it can be operated in such a manner to comply with the MACT Rule emission rate limits. If not, the BRA must be closed. Therefore, it would be more appropriate to model future BRA emissions based on the maximum emission rates allowed under the HWC MACT regulations.

   Response. This comment introduces the concept of completing the risk assessment process using MACT stack gas concentration levels. Documentation of compliance with the MACT standards for hazardous waste combustors (HWC) is not required to be included in the facility operating record until September 30, 2002. Notification of compliance with the HWC MACT standards (following completion of a HWC MACT comprehensive performance test) is not required until August 30, 2003. The draft protocol has been developed to satisfy the requirements of the current TOCDF and CAMDS RCRA permits. This issue will be reviewed during the MACT HWC permitting process.

6. **General Comment.** The bulk of Section 2 (Facility Description) is devoted to explaining how the incinerator emission rates for the various COPC were determined. The HWC MACT regulations establish maximum allowable exhaust gas concentrations for metals, particulate, dioxins, hydrocarbons, hydrochloric acid and chlorine. These exhaust gas concentrations, which can be converted to equivalent emission rates, were determined to be protective of human health and the environment by being subjected to a Heath Risk Assessment analysis. The MACT regulations allow state administrators to regulate lower, more stringent incinerator exhaust gas concentrations if they are required to protect human health and the environment.

   The following paragraphs are taken from the preamble associated with the HWC MACT rulemaking. They support the view that a regulatory agency must have a basis for imposing emission rates on a facility that are more stringent then those allowed for by the HWC MACT regulations, with the basis typically being the results of a risk assessment.

   SSRAs have come to be used by permitting authorities as a quantitative basis for making omnibus determinations for hazardous waste combustors (Federal Register Vol. 64, No. 189, Thursday, September 30, 1999, page 52840).

   Although our intent, consistent with the integration provision of RCRA section 1006Bb), is to avoid regulatory duplication to the maximum extent practicable, we may not eliminate RCRA requirements if a source's emissions are not protective of human health and the environment when complying with the MACT standards. (Federal Register Vol. 64, No. 189, Thursday, September 30, 1999, page 52840).

   We emphasize that the incorporation of site-specific, risk-based permit conditions into a permit is not anticipated to be necessary for the vast majority of hazardous waste combustors. Rather, such conditions would be necessary only if compliance with the MACT requirements is insufficient to protect human health and the environment pursuant to the RCRA mandate and if the resulting risk-based conditions are more stringent than those required under the CAA. Risk-based permit conditions could include, but are not limited to, more stringent emission limits, additional operating parameter limits, waste characterization and waste tracking requirements. (Federal Register Vol. 64, No. 189, Thursday, September 30, 1999, page 52843).

A comparison of the metal emission rates associated with the Draft DCD HHRA to those calculated based on the EPA HHRA MACT exhaust gas concentrations show the Draft DCD HHRA metal emission rates to be at least ten times lower than those allowed under the MACT Rule, and in some cases more than one hundred times lower.

The basis of the metal emission rate used in the DCD HHRA protocol should be the metal emission concentrations established by MACT. The completed HRA would then demonstrate whether or not the MACT limits for metals were protective of human health and the environment or if more restrictive limits are required. Without this demonstration, DSHW has no basis to regulate TOCDF emissions to values less than those established by the MACT Rule.

MACT based emission rates for dioxin, particulate, hydrochloric acid and chlorine could be modeled in the HRA for future agent campaigns.

Response. This comment advocates setting permit limits based on MACT stack gas concentration levels, instead of RCRA risk-based limits. Documentation of compliance with the MACT standards for hazardous waste combustors (HWC) is not required to be included in the facility operating record until September 30, 2002. Notification of compliance with the HWC MACT standards (following completion of a HWC MACT comprehensive performance test) is not required until August 30, 2003. The draft protocol has been developed to satisfy the requirements of the current TOCDF and CAMDS RCRA permits following U.S. EPA guidance on risk assessments for HWCs. This issue will be reviewed during the MACT HWC permitting process.

Specific Comments

Please note that the comments included underlined text and redlined, strikethrough text.

1. **Specific Comment.** Page 7, first paragraph, second sentence: TOCDF is contractor operated by EG&G Defense Materials, Inc.

Response. Section 2.1.3.1 has been revised according to the comment.

2. **Specific Comment.** Page 12, third paragraph, last sentence: The LICs, MPF, and DFS, may operate at the same time. ~~as either the MPF or DFS; however, the MPF and the DFS do not typically operate at the same time~~.

This may be a true statement regarding CAMDS, but not for TOCDF. The TOCDF is an integrated plant that requires operation of each type of incinerator to perform its mission. Energetic downloaded munitions projectiles require operation of the DFS, MPF, and at least one LIC.

Response. Section 2.1.1 has been amended with the correct information.

3. **Specific Comment.** Page 22 Table 2-10: The agent feed rate value for VX and mustard agent and agent contaminated liquids seem to be switched. The VX feed rate can't be greater than the GB feed rate. The VX feed rate is limited by the BTU content of the waste. VX has a higher heating value than GB.

Response. Table 2-10 has been revised in accordance with the comment.

4. **Specific Comment.** Page 24, first paragraph, second sentence: These components include empty ton containers, empty spray tanks ~~containers~~, and bomb, ~~mine~~, mortar, and projectile shells.

   This section discusses the MPF. Mines are treated in the DFS, not the MPF.

   Response. Section 2.2.1.2 has been revised in accordance with the comment.

5. **Specific Comment.** Page 24, second paragraph, last sentence: The AQS measures the amount of agent drained from the ~~rocket~~ item, and the PLC calculates the amount of remaining agent before the ~~rocket~~ item is fed into the TOCDF MPF.

   This paragraph discusses the MPF. Rockets are treated in the DFS, not the MPF.

   Response. Section 2.2.1.2 has been revised in accordance with the comment.

6. **Specific Comment.** Page 27, third paragraph, second sentence: The TOCDF DFS packed bed clear liquor flow rate is typically 750 to ~~7,000 gpm~~ 1,000 gpm.

   The packed bed scrubber clear liquor average flow rate measure during the DFS GB Agent Trial Burn-2 fuel only and each performance run was 1,000 gallons per minute.

   Response. Section 2.2.1.3 has been revised in accordance with the comment.

7. **Specific Comment.** Page 27, last paragraph: Unlike the JACADS and TOCDF MPF, the CAMDS MPF and LIC share the same PAS. The JACADS MPF has a dedicated PAS, but shares a common stack with the LIC and DFS. Likewise, the TOCDF MPF shares a common stack with the LIC and DFS.

   This paragraph is included in the section describing the TOCDF DFS but the topic of the paragraph is the MPF PAS.

   Response. Section 2.2.1.3 has been revised in accordance with the comment.

8. **Specific Comment.** Page 28, Table 2-12 second to last row, under heading TOCDF: The highest exhaust gas flow rate measured by an isokinetic sampling train for performance runs conducted during theDFS GB Agent Trial Burn-2 was 8,877 dscfm. The value appearing in the table (10,500 Dscfm) is not correct.

   Response. Table 2-12 has been revised in accordance with the comment.

9. **Specific Comment.** Page 29, third paragraph: The TOCDF DFS is not permitted to treat HD. However, bursters from HD-filled projectiles are anticipated to be treated in the TOCDF DFS. No chemical agent is anticipated with the bursters, and no other HD related munitions are anticipated for treatment in the DFS. The bursters from HD-filled projectiles are similar to the bursters from GB-filled projectiles which will be treated at TOCDF. A JACADS DFS GB trial burn test (Raytheon 1998) was conducted while treating bursters from 9-Inch projectiles representative of HD projectile bursters to be treated in the TOCDF DFS. Due to (1) the similarity of the TOCDF DFS and the JACADS DFS, (2) the lack of trial burn test data for the TOCDF DFS while treating chemical agent HD, and (3) the lack of trial burn test data from any other similar facility (such as CAMDS) while treating chemical agent HD; trial burn test data for

the JACADS DFS while treating ~~chemical agent GB~~ 8-inch GB projectiles (Raytheon 1998) will be used to estimate the stack gas emission rates for the TOCDF DFS while treating HD.

Response. Section 2.2.1.3 has been revised in accordance with the comment.

10. **Specific Comment.** Page 32 fifth paragraph: Chemical munitions treated in the CAMDS MPF are punched and drained, and then fed to the CAMDS MPF. Chemical agent is drained from the munitions by pumping the agent to the AQS and then to the ACS tanks. The AQS measures the amount of agent drained from the ~~rocket~~ item and the PLC calculates the amount of remaining agent before the ~~rocket~~ item is fed into the CAMDS MPF.

Response. Section 2.2.2.1 has been revised in accordance with the comment.

11. **Specific Comment.** Page 99, Section 3.6.2, first sentence: U.S. EPA (1998a) states that of the 80 percent total mercury found in the vapor phase, 20 percent is in the elemental form and 60 percent is in the divalent form.

Only a total of 80 percent of the vapor phase mercury is accounted for (60 + 20). What form is the other 20 % of the vapor phase mercury in?

Response. The comment requests clarification for the phase allocation and speciation of mercury in air. Section 3.6.2 has been revised to provide further discussion of the phase allocation and speciation of mercury in air. The text correctly states that 80 percent of mercury is present in the vapor phase. The other 20 percent is present in the particle bound phase. Of the 80 percent in the vapor phase, 60 percent is divalent mercury and 20 percent is elemental mercury.

12. **Specific Comment.** Page 110, Table 4-2, Table Heading "Contaminated Medium", Category "Homegrown Animal Products". Has the issue of the consumption of goat's milk by Resident or Subsistence Rancher been resolved? Past comments concerning the TOCDF Site Screening Risk Assessment performed by AT Kearny referenced that although cow's milk was not consumed by people in Rush Valley, goat's milk was.

Response. The DSHW has interviewed local residents and reviewed court transcripts regarding consumption of local foods. People raise dairy goats, but presently there is no human consumption of the milk. However, the ingestion of goat's milk will be included as a potential future exposure pathway if adequate information is available to estimate goat-specific bio-transfer factors based on extrapolation from cow milk. If adequate information is not available, this issue will be addressed in the uncertainty section. Section 4.2 will be revised accordingly.

TOCDF Field Office

1. **Comment.** Clarify that Table 2.1 represents the Tooele original stockpile prior to August 1996.

Response. Table 2-1 of the draft protocol has been revised to clarify the basis of the date of the stockpile information.

2. **Comment.** Section 2.1.1 – Rush Valley is not "surrounded by the Great Salt Lake to the North." Tooele Valley is located to the north of Rush Valley. DCD is northwest of Provo.

Response. Section 2.1.1 has been revised in accordance with the comment.

3. **Comment.** Section 2.1.3.2, page 9. The decision to process mines and/or other munitions at CAMDS will be a programmatic decision and has not been made at this time. It would be best to assume that all stockpile munitions will be destroyed at TOCDF.

   Response. The discussion in the draft protocol is based on interviews of CAMDS personnel during the evaluation process for the MPF permit modification. Because the actual activities to be completed at CAMDS cannot be determined at this time, this approach is the most conservative method for evaluating CAMDS in the risk assessment.

4. **Comment.** Section 2.1.3.3 – page 8. TOCDF Permitted Storage is not discussed. This includes CHB,UPA,ECV,UPMC,TMA,S2 and ACS tanks, SDS Tanks, BRA Tanks.

   Response. Section 2.1.3.3 of the draft protocol has been revised to include a description of TOCDF permitted storage.

5. **Comment.** Section 2.2.1 page 12,third paragraph. The CHB is not under HVAC control.

   Response. Section 2.2.1 of the draft protocol has been revised in accordance with the comment.

6. **Comment.** Section 2.2.1.3 page 26, Last paragraph. ~~Chemical Munitions~~ Rockets treated in the TOCDF DFS are typically punched and drained before….

   Response. Section 2.2.1.3 of the draft protocol has been revised to include the recommended language.

7. **Comment.** Table 2-12, page 28. Cross reference this table to TOCDF RCRA Permit Attachment 19. Multiple errors/inconsistencies.

   Response. Many of the inconsistencies in Table 2-12 are related to differing information presented in the permit applications, trial burn reports, and permits for the DFS related to ranges of expected operating parameter values. Table 2-12 of the draft protocol has been revised to clearly indicate the sources of the data used in order to eliminate any confusion.

8. **Comment.** Section 2.2.1.4, page 30. The TOCDF BRA does not have an afterburner. There are no organics in the Brines. The BRA does have a "Duct Heater", the purpose of which is to maintain the temperature of the gases above the dew point prior to the baghouse.

   Response. Section 2.2.1.4 has been revised in accordance with the comment.

9. **Comment.** Section 2.2.1.5 page 30. The CHB is not under HVAC.

   Response. Section 2.2.1.5 has been revised in accordance with the comment.

10. **Comment.** Section 2.2.2. The use of CAMDS for stockpile destruction cannot be stated as fact at this time. This section should be carefully reviewed by CAMDS personnel for accuracy.

    Response. The discussion in the draft protocol is based on interviews of CAMDS personnel during the evaluation process for the MPF permit modification. Because the actual activities to be completed at CAMDS cannot be determined at this time, this approach is the most conservative method for evaluating CAMDS in the risk assessment.

11. **Comment.** Section 2.4.2.8. The TOCDF DFS is not permitted to treat HD. See EG&G Specific Comment number 9.

Response. Although it is true that the TOCDF DFS is not permitted to treat HD, it does handle HD-related munitions. The discussion of this issue in Section 2.4.2.8 has been revised to clearly indicate that the TOCDF DFS is not permitted to treat HD.

12. **Comment.** 2.4.3.1 – THE TOCDF BRA is not approved for operation at this time. See EG&G General Comment number 5.

Response. Agreed. Section 2.4.3.1 of the draft protocol has been revised to clearly describe the current status of the TOCDF BRA.

13. **Comment (not originally numbered).** Section 8.2 – The LICs and MPF routinely run simultaneously.

Response. The text in Section 8.2 of the draft protocol has been revised in accordance with the comment.

APPENDIX G-3

RESPONSES TO COMMENTS FROM FAMILIES AGAINST INCINERATOR RISK

(Eight Pages)

RESPONSE TO COMMENTS FROM FAMILIES AGAINST INCINERATOR RISK

Comments were submitted November 9, 2000, by Mr. Jason Groenewold, Director of Families Against Incinerator Risk, 165 S. Main Street, Suite 1, Salt Lake City, Utah 84111

1. **Comment.** As you know, there have been hundreds of modifications to the Tooele Chemical Agent Disposal Facility (TOCDF) permit since it was issued in 1989. One of the more significant modifications that was made was in regards to burning greater than 5% residual agent heels in the Metal Parts Furnace (MPF) and the Deactivation Furnace System (DFS). The original HRA was based on the assumption that agent would be drained from the munitions before they were incinerated, and the trial burns that were conducted were based on these assumptions as well. Before the HRA is completed, we would ask that you require trial burns on the new operating conditions created for GB heels so that we can obtain more accurate information on the actual emissions being released from the TOCDF.

Response. This comment concerns the potential for increased COPC emissions due to the treatment of munitions with chemical agent heels in excess of the amounts used during the trial burn test. Because the agent feed rates are based upon the number of chemical munition units and waste mass per unit time, the trial burn test data available are representative of the current operations. Due to the design of the MPF and DFS, waste agent is essentially evaporated in the primary chamber. The secondary combustion chamber (or DFS afterburner) is mostly responsible for the actual waste destruction. Due to unit and mass feed rate limitations, the flow rate of agent to the secondary combustion chambers of these devices under the "new" conditions referenced in the comment are equal to the agent feed rates demonstrated during the trial burn tests. Section 2.4.1 of the draft protocol has been revised accordingly.

2. **Comment.** FAIR would request that this also be done for the VX and Mustard campaigns since it is likely that gelled/crystallized agent will be found in portions of those munitions as well. This is the only way to ensure that the information being used in the HRS is accurate and reflective of actual operations of the TOCDF.

Response. Please see the response to Comment 1 above. The trial burn tests for the VX and HD campaigns have not yet been conducted. An evaluation of the number of potentially gelled VX and HD munitions is currently being conducted. This comment and the results of this evaluation will be considered in the planning for the VX and HD campaign trial burn tests.

3. **Comment.** It also seems appropriate to use all emissions data that is available, and not just those tests that were accepted by the Army and the DSHW. Will you consider all trial burns and emissions tests from CAMDS, JACADS, and TOCDF? What about the tests at CAMDS and JACADS for VX, GB,HD.

Response. The basis for this comment is unclear. The draft protocol considered all of the available data. These reports are clearly referenced throughout Section 2.0 and in particular in Table 2-14. Data from failed trial burn tests, trial burn tests conducted without oversight by DSHW, or unapproved trial burn reports will not be used because the RCRA operating permit limits are based on approved trial burns.

4. **Comment.** Will you be looking at neurological, immunological, and reproductive disorders that may occur from exposure to the toxins released from the incinerator? How about endocrine disruption, learning disorders, and birth defects? How will you determine risks from dioxin exposure? If there are reference doses for toxins that are used in the EPA's water standards or in

the ASTDR? Will you use those reference doses to compute acceptable exposure scenarios? You have looked outside of IRIS and HEAST when they have not had reference doses for things like nerve agents, so will you do the same for dioxin?

Response. The comment refers to a broad range of disorders, attributable to chronic exposure to many chemicals, which have been described in the scientific literature. The health benchmarks (toxicity values) developed by U.S. EPA for health risk assessments, such as reference doses (RfD) and slope factors (SF), are based on a detailed assessment of peer-reviewed scientific literature and other studies, and have been verified by expert workgroups. The health benchmarks are specifically designed to protect an individual against the critical toxic effect (the adverse health effect caused by the lowest chemical concentration), which assumes that if the critical toxic effect is prevented, then all toxic effects are prevented. The health benchmarks are also designed to be protective in order to accommodate variations in population susceptibility, as well as to ensure that individuals of sensitive subpopulations are also protected.

An RfD is an estimate (with uncertainty spanning perhaps an order or magnitude or greater) of a daily exposure level for the human population, including sensitive populations, that is likely to be without appreciable risk of deleterious effects during a lifetime. An RfD is a very conservative (protective) estimate of toxicity. An RfD is derived from the no observable adverse effect level (NOAEL) (or the lowest observable adverse effect level [LOAEL]) for the critical toxic effect by applying uncertainty factors (UF) and a modifying factor (MF):

- A UF is used to account for variation in the general population and is intended to protect sensitive subpopulations (e.g., elderly, children)

- A UF is used when extrapolating from animals to humans and is intended to account for the variability between humans and other mammals

- A UF is used when an NOAEL derived from a subchronic study instead of a chronic study is used as the basis for the chronic (lifetime) RfD

- A UF is used when an LOAEL is used instead of an NOAEL and is intended to account for the uncertainty associated with extrapolating from an LOAEL to an NOAEL

- An MF is applied if qualitative professional assessment indicates additional uncertainties in the critical study used to derive the RfD and in the database for the chemical

SFs are used to assess carcinogenicity of chemicals. The SF defines quantitatively the relationship between dose and response. An SF is a very conservative (protective) measure of carcinogenic potency. It is a plausible upper-bound estimate (95^{th} percent confidence limit of the slope of the dose-response curve) of the probability of a response (per unit intake of a chemical) over a lifetime.

As such, in accordance with U.S. EPA combustion risk assessment guidance, U.S. EPA's Integrated Risk Information System, which lists up-to-date, verified RfDs and SFs, will be used as the source of health benchmarks for dioxin. Likewise, health benchmarks for agents managed at Deseret Chemical Depot were developed using current U.S. EPA methods by the Army Center for Health Promotion and Preventive Medicine. These benchmarks have undergone peer-review by the National Research Council. Dioxins will be evaluated in accordance with U.S. EPA combustion risk assessment guidance. As discussed in Section 7, dioxin cancer risk will be

evaluated be comparing the 2,3,7,8-tetrachlorodibenzo(p)dioxin (TCDD) toxicity equivalents (TEQ) value to the 2,3,78-TCDD SF. Dioxin hazards will be evaluated by comparing the 2,3,7,8-TCDD TEQ value to the background target levels of 0.1 picograms per kg per day (for adult) and 6.0 picograms per kg per day (for nursing infant through breast milk pathway).

The comment also discussed the possible use of the Office of Water ingestion RfD for dioxin. After U.S. EPA finalizes recommendations from the dioxin reassessment study and incorporates recommendations into the protocol for performing health risk assessments for hazardous waste combustion facilities, we recommend that DSHW review the revised protocol and incorporate relevant aspects into future risk assessments under DSHW purview.

5. **Comment.** Will you incorporate the latest information on dioxin exposure as was discussed in the latest EPA draft on the dioxin reassessment? I know it has not yet been finalized, but we believe there are some very significant findings that should be incorporated into this HRA. We agree with your position that dioxin emissions from TOCDF should not be compared to background levels and assumed to be safe if they are less than the total background levels, but it would not be appropriate to calculate the dioxin risk without accounting for the current exposure levels in the American population.

Response. Relevant aspects of the dioxin reassessment study will be evaluated for incorporation into future risk assessments (for example, an updated risk assessment may need to be performed after new trial burn data are collected) after the document is finalized by U.S. EPA. With regard to the issue of background levels of dioxin, the risk assessment will be performed in accordance with current U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol) for performing risk assessments on emissions from incinerators regulated under the Resource Conservation and Recovery Act, which does not recommend evaluating current exposure levels in the American population. Also see response to Sierra Club comment 2 and Kentucky Environmental Foundation comment 13. No revision was made to the protocol.

6. **Comment.** Will you consider synergistic effects caused by chemicals mixing together? Will you consider synergistic effects of the TOCDF emissions with other sources? Are you going to assess the total risk to those who live within a fifty-mile radius of the TOCDF and what impacts are caused by all sources within this area? Will you be assessing the current health status of the people in our community before you determine what are acceptable amounts of pollutants to be released from the incinerator?

Response. We understand the comment to inquire if the DSHW will consider synergistic effects, cumulative risks of all sources in the area, and the current health status of the people in Tooele County. The draft protocol complies with the U.S. EPA combustion risk assessment protocol that assumes the effects from the same and other TOCDF emission sources within the assessment area are additive. Also see response to Kentucky Environmental Foundation comment 21. No revisions were made to the draft protocol.

7. **Comment.** Can you please identify all operating conditions that were tested in the trial burns that you are relying on in your emissions data for the HRA? Can you also say when these tests were done and at what facility?

Response. This comment addresses two separate issues. The first issue requests the presentation of operating data for the trial burn test data used. For those scenarios where the trial burn tests have been conducted (for example, all of the TOCDF GB scenarios), the permit limits are derived from the trial burn test operating data. Additionally, operating parameter data are available in the trial burn reports referenced throughout Section 2.0. These reports are available from DSHW. Finally, once a trial burn test has been completed for the scenarios where extrapolation was used, the actual emission rates will be compared to the surrogate rates to ensure that the emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated. Section 2.3 of the draft protocol has been modified to more clearly indicate that the permit conditions are representative of operating parameter values measured during trial burn tests from which emission rate data has been derived.

The second issue addresses the source of the data used. The draft protocol clearly references all of the available data that could have been used to compile the emission rate estimates included in Appendixes A, B, and C—regardless of whether this data was actually used (depending on the proposed methodology for each specific unit). These reports are clearly referenced throughout Section 2.0 and in particular in Table 2-14. No revisions to the draft protocol have been made.

8. **Comment.** Why do you assume 20% upsets for organic material and only 5% upsets for inorganic materials? Shouldn't it be the same? Why do you assume that emissions will only be greater than 10 times allowable amounts, during upset conditions? During the MC-1 bomb overfeed, emissions were over 511 times what is allowed by the permit.

Response. U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) recommends using default upset conditions (20% for organics and 5% for inorganics) when site-specific data is not available. The derivation of these factors originated from studies that were performed by the California Air Resources Board in 1990. Site-specific upset factors were available for TOCDF and were correctly applied to adjust the emission rates. Therefore, no revisions were made to the draft protocol.

9. **Comment.** How do you assume that doubling the feed-rate will only result in a doubling of the emissions? Can you please site the literature and tests that you rely on to make this assumption?

Response. Actual trial burn test emission rate data are always preferable to extrapolated data. For the draft protocol, extrapolation is only used to evaluate the potential emission rates from those sources and those scenarios for which trial burn test data are not yet available. Section 2.4.2 of the draft protocol has been revised to include a detailed description of the basis for the extrapolation methods used. In general, feed rate increases are expected to generate a linear increase in the emission rates due to the fact that air pollution control systems are designed to remove a percentage of the input mass, rather than treating the output to a fixed numerical value or concentration. Therefore, a doubling in the feed rate is expected to double the emission rate. Once a trial burn test has been completed for the scenarios where extrapolation was used, the actual emission rates will be compared to the surrogate rates to ensure that emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated.

10. **Comment.** On page 83, it is stated that there were only particulate and metals emissions of .011% and .371% non-peak organic emissions during 1998 resulting from up-set conditions. How do you explain the nerve agent alarms that are occurring on an almost daily basis? Are these upset conditions, and if so, are you including them? If not, can you please explain why they are not? Do you assume that the TOCDF will maintain the same level of emissions and upsets for the next 15 years as equipment deteriorates and more difficult munitions are incinerated?

Response. This comment addresses two separate issues. The first issue is the false ACAMS (automatic continuous air monitoring system) alarms in the stack at TOCDF. The ACAMS are designed to minimize the probability of false negative agent detections (a false negative is when the ACAMS does not alarm when GB is present at a concentration greater than the alarm set point). The low probability of a false negative detection results in an increase in the occurence of false positives (that it, the ACAMS alarms when it should not). Upset conditions that result in products-of-incomplete combustion that have a similar chromatographic column retention time as GB (often described as the agent window or gate) or are present at a sufficient concentration that the chromatographic peak crosses into the agent window, may cause the ACAMS to erroneously alarm. Chemicals that cause the ACAMS to erroneously alarm are called interferents. The ACAMS is not calibrated for chemicals other than GB, so quantifying the amount of an interferent is uncertain. Due to the specificity of the ACAMS for GB, the majority of products-of-incomplete combustion would not be expected to cause an alarm. For these reasons the ACAMS is not a reliable indicator of upset conditions.

The second issue is regarding assumptions about upset factors. Given (1) the redundancy of the facility design, (2) the high quality of initial construction, and (3) the operating and maintenance procedures currently in-place at TOCDF, the an increase in emissions is not expected over the life of the facility. If this assumption cannot be confirmed, the upset assumption in the risk assessment will be reevaluated. Section 2.4.5.3 has been revised to include additional discussion of this issue.

11. **Comment.** A point of correction may be the assumptions about the DFS and MPF and the assumptions of how munitions are processed. FAIR believes you should include current practices which includes feeding full rockets into the DFS. Also, can you please include the temperature adjustments and residence time variations with processing greater than 5% residual agent heels?

Response. This comment concerns the potential for increased COPC emissions due to the treatment of munitions with chemical agent heels in excess of the amounts used during the trial burn test. Because the agent feed rates are based upon the number of chemical munition units and waste mass per unit time, the trial burn test data available, and therefore, the emission rates, are representative of the current operations. Due to the design of the MPF and DFS, waste agent is essentially evaporated in the primary chamber. The secondary combustion chamber (or DFS afterburner) is mostly responsible for the actual waste destruction. Due to unit and mass feed rate limitations, the flow rate of agent to the secondary combustion chambers of these devices under the "new" conditions referenced in the comment are likely to be essentially equal to the agent flow rates demonstrated during the trial burn tests. Section 2 of the draft protocol has been revised to clearly explain this aspect of the risk assessment.

12. **Comment.** Why do you consider a 20 km dispersion of emissions from TOCDF in section 4.1? Is there something that prevents emissions from traveling further?

Response. The air dispersion modeling was conducted in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). The limit of the U.S. EPA ISCST3 air

dispersion model is 50 kilometers. Emissions potentially travel beyond the distances modeled but the impacts will be less. All of the U.S. EPA recommended exposure scenarios are located within three kilometers of Deseret Chemical Depot. The health risk assessment methodology is designed to evaluate the potential health risks for the highest likely exposures. If the health risks are below levels of concern for the highest exposures, the health risks are below levels of concern for all other people.

13. **Comment.** Does the Rainbow Reservoir have fish? How will it be evaluated?

Response. The Deseret Chemical Depot plans on stocking Rainbow Reservoir with fish in the near future. An additional exposure scenario to evaluate fish ingestion from Rainbow Reservoir has been added. Section 4.2 and Tables 4-1 and 4-2 have been revised accordingly.

14. **Comment.** Will you assess the risks of people who raise and consume sheep in the area? What about people who consume goats milk? Are there workers at TOCDF or CAMDS who raise sheep or goats and consume any of those products? Why do you only look at consumption of dairy products and cow's beef and pork as a future risk? If people have dairy cattle and could consume those products at any time, wouldn't it be more appropriate to assess this as a potential current risk?

Response. The first part of the comment requests further clarification concerning the consumption of sheep meat and goat's milk in Tooele County. The second part of the comment asks why the consumption of dairy products and cow's beef and pork will be evaluated as potential future pathways.

The pathways identified in the protocol are based on U.S. EPA guidance and the DSHW's understanding of local farming practices. Some depot workers raise and consume homegrown animal products. The DSHW has identified the consumption of homegrown beef and sheep meat in the vicinity of Deseret Chemical Depot, but not goat's milk. Pigs have been identified in the vicinity of Deseret Chemical Depot but they are not likely to be contaminated by emissions because they don't consume local feed. Consistent with observations by the DSHW, the Utah Department of Agriculture reported no dairy cows in Tooele County for 1999. Chicken and eggs are locally grown and are fed local feed. If a scenario does not currently occur (for instance, dairy cows), but could plausibly occur at sometime in the future, the potential risks from that pathway will be evaluated as a potential future scenario. The distinction between current and future potential exposure pathways is anticipated to be helpful in interpreting the health risk assessment results.

The following homegrown animal product scenarios will be evaluated:

- Information indicates that sheep meat is consumed and is potentially contaminated. Therefore, ingestion of mutton will be evaluated as a current pathway. However, the data limitations may introduce uncertainties into the evaluation. Biotransfer factors (the ratio of a concentration of a contaminant in feed to the concentration in the meat) are based on cattle.

- There is no known consumption of goat's milk in Tooele County. Therefore, ingestion of goat's milk will be evaluated as a potential future exposure pathway. The availability of biotransfer factors for goats may introduce uncertainties into the evaluation.

- There are no known dairy cows in Tooele County. Therefore, ingestion of cow's milk will be evaluated as a potential future exposure pathway.

- Homegrown beef is consumed and is potentially contaminated. Therefore, ingestion of beef will be evaluated as a current exposure pathway.

- Homegrown pork is consumed but is not expected to be contaminated from emissions because the pigs are not fed local feed. Ingestion of homegrown pork will be evaluated as a potential future exposure pathway.

- Homegrown chicken and eggs are consumed and are potentially contaminated. Ingestion of these items will be evaluated as current exposure pathways.

Section 4.2.2.2 of the protocol will be revised to include a discussion on the methods for evaluating the ingestion of homegrown mutton, goat's milk, cow's milk, beef, pork, chicken, and eggs.

15. **Comment.** Why do you assume that an on-site worker will have less exposure than a rancher and resident for breast milk exposure? What if a woman works at TOCDF or CAMDS and lives in the local area? What is the total risk of this scenario?

Response. The comment inquires why the breast milk pathway will not be evaluated for an on-site worker. For completeness, the breast milk pathway will be evaluated for an on-site worker. Section 4.2 and Tables 4-1 and 4-2 have been revised accordingly.

16. **Comment.** Will you use the new toxicity estimates of chemical warfare agents identified by the National Research Council? Will you be looking at the Centers for Disease Control assessment of the toxicity of these chemical agents?

Response. The comment refers to the recent National Research Council (NRC) review of interim chronic oral toxicity values proposed by the Army Office of The Surgeon General. The NRC-recommended toxicity values are similar (that is, within an order of magnitude) or the same as the Army interim values. The U.S. Army Center for Health Promotion and Preventative Medicine reviewed NRC's recommendations:

- The NRC concurred with the Army interim oral reference dose (RfD) values for GB and HD.

- The NRC recommended RfD for VX is within one order of magnitude of the interim Army value. However, the Army determined that the NRC-recommend VX RfD value (0.0000005 mg/kg/day) is based on lower quality data and, therefore, concluded the Army interim RfD for VX is adequately (0.0000006 mg/kg/day) protective.

- The NRC recommended an HD oral cancer slope factor (CSF), a measure of potency, of 1.6 per mg/kg/day, which is less conservative (lower carcinogenicity potency) than the Army interim value of 95 per mg/kg/day. Based on an alternative method for estimating a CSF, the Army evaluated newly available data and proposed a revised HD CSF of 7.7 per mg/kg/day, which is the recommended value.

The DSHW has also reviewed the health benchmarks and believes that the benchmarks recommended by USACHPPM are the best available for GB, VX, and HD.

The comment also refers to the inhalation benchmarks for GB and VX that are under review by the Center for Disease Control. Pending final recommendations by the Center for Disease Control, the USACPPM benchmarks are the best available.

Section 6.3 has been revised to indicate the new health benchmarks for chemical warfare agents that will be used in the risk assessment. Also see USACHPPM comment 20.

17. **Comment.** Under section 6.4, would it be more protective to use an infant to calculate the RfC?

Response. In accordance with current U.S. EPA health risk assessment guidance for hazardous waste combustion facilities, we obtained the most current RfCs from U.S. EPA's Integrated Risk Information System. If an RfC is not available, and an RfD is, a route-to-route extrapolation may be conducted to estimate an RfC using the U.S. EPA recommended methods that are based on adults.

APPENDIX G-4

RESPONSES TO COMMENTS FROM KENTUCKY ENVIRONMENTAL FOUNDATION

(Eight Pages)

RESPONSES TO COMMENTS FROM KENTUCKY ENVIRONMENTAL FOUNDATION

Comments were submitted to DSHW on November 13, 2000, by Mick G. Harrison, Esq., Kentucky Environmental Foundation, 200 Short Street, 2nd Floor, Berea, Kentucky 40403.

1. **Comment.** The emissions estimates for TOCDF must be based on inter alia and include a measurement of the total dioxin-like emissions and total dioxin-like toxicity of a representative sample of stack gas (for example using a bioassay approach).

Response. The emission rates in the draft protocol include all dioxin-like chemicals (chemicals with a U.S. EPA 2,3,7,8-tetrachlorodibenzo(p)dioxin toxic equivalency factor [TEF}) from a representative sample of stack gas. The toxicity of the dioxin-like chemicals are evaluated by calculating 2,3,7,8-tetrachlorodibenzo(p)dioxin toxic equivalents (TEQs) in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). Bioassays (exposing a living organism to stack gas and evaluating adverse health effects) were not conducted for any of the trial burns and are not recommended in U.S. EPA guidance. Bioassays would have serious methodological challenges such as overcoming the oxygen-deficit of stack emissions or assigning toxicity to the appropriate chemical. No changes to the protocol were made.

2. **Comment.** The emissions estimates for TOCDF must be based on and include inter alia a measurement of the total toxicity of a representative sample of stack gas (for example using a bioassay approach).

Response. The health risk assessment will be conducted in accordance with the methodology recommended by the U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol). These methods do not include the direct use of bioassays. Bioassays do form the basis for the reference doses and cancer slope (potency) factors derived by the U.S. EPA. Section 7.0 Risk Characterization describes how the reference doses and cancer slope factors are used to evaluate the potential for adverse health effects from exposure to stack emissions. Also, please see the response to Kentucky Environmental Foundation comment 1. No changes to the protocol were made.

3. **Comment.** The emissions estimates for TOCDF must be based on and include inter alia an identification and measurement of each of the PICs in a representative sample of stack gas (for example using the multi-dimensional gas chromatography approach described by the 1998 U.S. EPA report on identifying a target analyte list for hazardous waste incinerators).

Response. The health risk assessment will be conducted in accordance the methodology recommended by the U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol). The trial burn emissions are collected and analyzed in accordance with U.S. EPA methods or DSHW-approved methods. The DSHW requires that tentatively identified compounds be reported and their concentrations estimated. In addition, in accordance with U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) recommendations, a total organic emissions analysis is conducted to evaluate the potential for emissions of non-target organic chemicals. The DSHW presumes the comment is referencing *Development of Hazardous Waste Incinerator Target Analyte List of Products of Incomplete Combustion* (EPA/600/R-98/076). This document was prepared as part of the U.S. EPA National Risk Management Research Laboratory's long-term research plan. The DSHW's understanding is that the U.S. EPA considered the findings of this study in preparing U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol). No change was made to the protocol.

4. **Comment.** The HRA/PP must provide for emissions characterization by measurement rather than estimate where technology allows.

Response. When available, the emission estimates were based on actual measurements during trial burns. The health risk assessment protocol estimated emissions when site- or waste-specific emissions data were not available. The estimates were based on emissions data from similar facilities that treat similar waste in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). This procedure (that is, predicting future emissions) facilitates decision-making prior to a permittee committing resources for a process that may ultimately not be permitted. The methods used for extrapolating emission rates for the health risk assessment protocol are intended not to underestimate actual emissions. This assumption will be verified with trial burn measurements of emissions and the health risk assessment updated as warranted. Additional detail has been added to the protocol to clarify the sources of emissions data.

5. **Comment.** The HRA/PP must include an assessment of the total emissions and toxicity of all air pollution sources at the Depot, whether RCRA regulated or not.

Response. The emission sources evaluated as part of the risk assessment process were selected based upon current U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). These guidelines do not include the evaluation of non-RCRA regulated emission sources. No changes were made to the protocol.

6. **Comment.** The HRA/PP must adequately consider both the breast-fed infant and the developing fetus both as sensitive populations and as highly exposed populations.

Response. As discussed in Section 4.2.2.5 of the Draft Human Health Risk Assessment Protocol, the breast fed infant is evaluated as a potentially sensitive and highly exposed population. U.S. EPA references doses are intended to protect sensitive members of the population. If the critical toxic effect (the toxic effect on which the reference dose is based) is based on developmental effects or developmental effects potentially occur at doses higher than the dose associated with the critical effect, the developing fetus is protected. The methods used are recommended in U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). No changes were made to the protocol.

7. **Comment.** The UDEQ needs to be honest with the public regarding the fact that the EPA does have and use an RfD for dioxin non-cancer effects of 1 pg/kg/day TEQ and the new literature on dioxin and the new EPA Dioxin Health Assessment, draft or not, provide no basis for making this number less protective (larger), but do provide a basis for making the number considerably smaller. Consequently, omitting an analysis of dioxin non-cancer effects for infants, adults or other populations on the excuse that EPA has no RfD is dishonest, reckless and likely criminal because it results in knowingly allowing the continued exposure of human beings to levels of hazardous waste and contaminants known to cause harm or to be virtually certain to cause harm. Using the 1 pg/kg/day RfD for total dose for the infant is much more defensible than omiting the anlaysis of dioxin exposure and risk for the infant altogether (which is insane), and using a smaller RfD value based on the greater sensitivity of the infant and additional unknowns regarding dioxin impacts on developing organisms is more defensible yet. The Commenters have provided to the UDEQ and Army EPA documents supporting this position and the Utah Court of Appeals has stated in a prior decision that it would expect the UDEQ to assess dioxin non-cancer effects for infants if a RfD were available (which it is).

Response. The potential health effects from exposure to 2,3,7,8-substituted chlorinated dioxins or furans are evaluated using cancer as an endpoint in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). A reference dose is required to evaluate the potential for noncancer effects. The U.S. EPA toxicological databases for risk assessment, Integrated Risk Information System (IRIS) and Health Effects Summary Tables (HEAST), do not list a reference dose for 2,3,7,8-substituted chlorinated dioxins or furans. The U.S. EPA National Center for Environmental Assessment (NCEA) recommends interim toxicity values for chemicals not in IRIS or HEAST. NCEA does not recommend the use of the 1 pg/kg-day as a reference dose for 2,3,7,8-tetrachlorodibenzo(p)dioxin. The DSHW presumes that the comment references the Utah Court of Appeals Case No. 971313-CA (reference is attached). The Utah Court of Appeals in footnote 4 stated "Thus, for instance, should the EPA arrive at a dioxin reference dose for infants, the Division would presumably incorporate the appropriate analysis in a risk assessment." No revisions were made to the protocol.

8. **Comment.** The HRA/PP must carefully consider the new Arkansas (Cramner) studies and new Dutch studies of infants, children and adults which show neurological and diabetes like adverse effects at levels of dioxin exposure already exceeded by most infants and children and many adults.

Response. The health risk assessment protocol follows current U.S. EPA recommendations for evaluating health risks from potential exposures to dioxin-like chemicals from hazardous waste combustion facilities (referenced as U.S. EPA 1998b in the draft protocol). The DSHW is unsure what studies the comment references. For instance, a search for Cramner as an author failed to return any citations from the Library of Medicine's Medline database. The DSHW is aware of studies from Europe and the United States that suggest exposures to dioxin-like chemicals may result in neurological deficits in children. The studies on U.S. Air Force (adult) personnel who participated in Operation Ranch Hand suggest a correlation between exposure to dioxin-like chemicals and the incidence of diabetes (http://www.brooks.af.mil/AFRL/HED/hedb/afhs/afhs.shtml). A cause-and-effect or dose-response relationship between exposure to dioxin-like chemicals and diabetes has not been identified. No revisions were made to the protocol.

9. **Comment.** The HRA/PP must address the risks from sensitization effects for organophosphates and synergistic effects for same and other TOCDF emissions including dioxin.

Response. The health risk assessment protocol follows current U.S. EPA recommendations for evaluating health risks from potential exposures to dioxin-like chemicals from hazardous waste combustion facilities (referenced as U.S. EPA 1998b in the draft protocol). U.S. EPA guidance recommends that cumulative exposures to chemicals be evaluated by assuming toxic effects are additive. For chemicals that do not have similar target organs, assuming additive toxic effects is not required (referenced as U.S. EPA 1998b in the draft protocol). The reference doses for organophosphates are based on studies with repeated exposures that would integrate any sensitization effects. No revisions were made to the protocol.

10. **Comment.** The HRA/PP must consider the accident risks at TOCDF using an anlaysis based on the approach of Professor Charles Perrow based on his studies of complex systems.

Response. The issue of accident risk is outside the scope of the risk assessment for routine emissions (referenced as U.S. EPA 1998b in the draft protocol). Accident risks are evaluated by the *Tooele Chemical Agent Disposal Facility Quantitative Risk Assessment*, SAIC Report 96/2600 (Science Applications International Corp., 1996).

11. **Comment.** The HRA/PP must include an analysis of EPA and industry data on organophosphate pesticides showing "U" shaped dose response curves indicating surprisng toxicity at lower doses.

Response. The DSHW is not aware of the data described in the comment and no reference was provided. The TOCDF and CAMDS are not permitted to treat hazardous wastes containing organophosphate pesticides. If organophosphate pesticides are determined to be chemicals of potential concern, toxicity values will be from the Integrated Risk Information System or Health Effects Assessment Summary Tables in accordance with the recommendations of U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol). No change was made to the protocol.

12. **Comment.** The HRA/PP must consider combined and cumulative exposures to pesticides together with nerve agent emissions from TOCDF.

Response: The exposure sources evaluated as part of the risk assessment process were selected based upon current U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). The TOCDF and CAMDS are not permitted to treat pesticides. Therefore, pesticides are not included in the risk characterization calculations. The health risk assessment uses a cumulative hazard index of 0.25 (one-fourth of a dose that is without adverse health effects) that is intended to account for other potential exposures that were either not identified or quantified. No change was made to the protocol.

13. **Comment.** The HRA/PP must incorporate the higher cancer and non-cancer toxicity estimates for dioxin reflected in the latest version of the EPA Dioxin health Assessment.

Response. The DSHW has reviewed the U.S. EPA 2000 dioxin reassessment document that is undergoing peer review. Some of the methods proposed in the 2000 reassessment are a departure from current U.S. EPA methods. Given the controversy and uncertainty surrounding this issue, the DSHW does not anticipate adopting the findings of this document prior to the document being finalized by the U.S. EPA. The health risk assessment protocol follows current U.S. EPA recommendations for evaluating health risks from potential exposures to dioxin-like chemicals from hazardous waste combustion facilities (referenced as U.S. EPA 1998b in the draft protocol). No changes were made to the protocol.

14. **Comment.** The HRA/PP must include a careful analysis of chemical warfare agent toxicity including consideration of the recent GAO study, the Congressional reports on Gulf War illness, the Army and NRC studies on upgrading agent toxicity estimates, and the Dugway sheep kill data available from the Army on CD-ROM.

Response. The toxicity benchmarks used in the risk assessment are the best current estimates available. The toxicity values were derived by the U.S. Army Center for Health Promotion, Prevention, and Medicine consistent with U.S. EPA methodologies. The toxicity values have been peer-reviewed and accepted by the DSHW for interim use. Some of the toxicity values will be reviewed by the U.S. EPA and Centers for Disease Control. Section 6.3 of the protocol discusses the sources of toxicity values. Also, please see response to FAIR comment 16. No changes were made to the protocol.

15. **Comment.** The HRA/PP must include emissions estimates based on trial burns of longer duration than standard trial burns based on recent studies showing short term trial burns give biased low emission measurement, and trial burns with the wastes to be burned including undrained rockets and greater than 5% heels in containers and munitions.

Response. The comment does not provide a reference for the "recent studies". When available, the health risk assessment relies on emission data from DSHW approved trial burns. An approved trial burn was conducted in accordance with U.S. EPA guidance that was available when the trial burn was conducted. Approved trial burns were also conducted with regulatory oversight. The second issue concerns the difference between trial burn test conducted with 5 percent agent heels versus full munitions. Because the agent feed rates are based upon the number of chemical munition units and waste mass per unit time, the trial burn test data available is representative of the current operations. Due to the design of the MPF and DFS, waste agent is essentially evaporated in the primary chamber. The secondary combustion chamber (or DFS afterburner) is mostly responsible for the actual waste destruction. Due to unit and mass feed rate limitations, the flow rate of agent to the secondary combustion chambers of these devices under the "new" conditions referenced in the comment are likely essentially equal to the agent flow rates demonstrated during the trial burn tests. Various sections of the draft protocol have been revised to clearly explain this basis for the completion of the risk assessment.

16. **Comment.** The HRA/PP must consider the recent findings of high levels of mercury and other metals in agent munitions and containers.

Response. The DSHW has evaluated the metals content of the hazardous waste being processed at the TOCDF. Based on current understanding, the GB trial burns conducted at TOCDF (the source of the emissions data for the health risk assessment) are representative. The Liquid Incinerator 1 1998 minburn was conducted specifically to test GB that contained higher metal concentrations than was tested during the previous liquid incinerator trial burns. As waste characterization data is generated, the DSHW will continue to evaluate if the trial burn emissions are representative. No changes were made to the protocol.

17. **Comment.** The HRA/PP needs to consider fugitive agent releases and worker exposures in agent migration and other incidents.

Response. The health risk assessment will not evaluate occupational exposures and accidental releases because they are beyond the scope of a RCRA risk assessment (referenced as U.S. EPA 1998b in the draft protocol). Worker exposures that may occur as part of a workers normal job duties are regulated by the Occupational Safety and Hazard Administration. Fugitive emissions from RCRA-regulated activities are addressed throughout Section 2.0. No changes were made to the protocol.

18. **Comment.** The HRA/PP needs to consider risk to workers based on the recent worker exposure and injury incident at the Umatilla facility.

Response. The health risk assessment will not evaluate occupational exposures because they are beyond the scope of a RCRA risk assessment (referenced as U.S. EPA 1998b in the draft protocol). Worker exposures that may occur as part of a workers normal job duties are regulated by the Occupational Safety and Hazard Administration. The DSHW's understanding is that no causative substance has been identified for the workers who became ill in September 1999 at the Umatilla chemical demilitarization facility. No changes were made to the protocol.

19. **Comment.** The HRA/PP needs to base agent emissions on actual measurements using a method validated by EPA for stack gas measurement of agent emissions.

Response. The U.S. EPA has not validated an analysis method for chemical warfare agents. The DSHW has determined that the sampling and analysis methods for stockpile chemical warfare agents are acceptable in accordance with the Utah Administrative Code R315-2-15. The Centers for Disease Control have also reviewed the sampling and analytical methods. No changes were made to the protocol.

20. **Comment.** The TOCDF HRA/PP must consider the cumulative and combined impacts of OB/OD past, present and future with the TOCDF and other area emissions because both TOCDF and OB/OD and other area pollution sources emit persistent toxic compounds that will not quickly degrade in the environment and will ultimately pose a combined threat via this persistence (for decades) notwithstanding that UDEQ may not allow OB/OD simultaneous with TOCDF operation.

Response. In accordance with U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) guidance, the TOCDF health risk assessment evaluates the cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the health risk assessment are intended to compensate for unidentified or unquantified exposures such as exposures attributable to past waste management activities. In addition, the results of the 1996 Agricultural Impact Assessment and RCRA Facility Investigations, Deseret Chemical Depot has not been impacted by persistent toxic compounds attributable to OB/OD. No change has been made to the protocol.

21. **Comment.** The HRA/PP needs to include an assessment of the total local impact of TOCDF emissions together with existing levels and continuing emissions of air pollutants from all other area sources, particularly in light of recent findings in a study by the Physicians for Social Responsibility, the National Environmental Trust, and the Learning Disabilities Association of America that concluded that air in Tooele County to be the most toxic in the nation, and polluted enough that local children could be seriously harmed by inhalation of the contaminants.

Response. In accordance with U.S. EPA guidance, the TOCDF health risk assessment evaluates the cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the health risk assessment are intended to compensate for unidentified or unquantified exposures. The Utah Department of Health has not identified a higher incidence of health effects attributable to air contaminants in Tooele County. No changes were made to the protocol.

22. **Comment.** The HRA/PP needs to include an assessment of the total non-local impact of TOCDF emissions together with existing levels and continuing emissions of air pollutants from all other national air pollution sources, particularly in light of recent findings in a study by Dr. Barry Commoner that concluded that long range atmospheric transport of persistent organic pollutants from air pollution sources in the United States was causing contamination of native lands, ecosystems and the foodweb in northern Canada, and similar studies showing that colder climate areas are the ultimate environmental sinks for persistent organic pollutants and are consequently developing dangerous levels of contamination.

Response. Although some research does support that the polar regions appear to be a sink for some persistent organic pollutants (for instance, see Simonich SL; Hites RA., Global distribution of persistent organochlorine compounds, *Science* 1995 Sep 29;269(5232):1851-4), evaluating impacts of persistent organic pollutants in northern Canada is beyond the scope of the health risk assessment and jurisdiction of the DSHW. In accordance with U.S. EPA guidance(referenced as U.S. EPA 1998b in the draft protocol), the TOCDF health risk assessment evaluates the

cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the health risk assessment are intended to compensate for unidentified or unquantified exposures. The U.S. EPA ISCST3 Air Dispersion Model has a 50 kilometer limit. The air dispersion modeling conducted for the health risk assessment focuses on receptors within 20 kilometers of Deseret Chemical Depot. All of the relevant exposures scenarios recommended by U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) occur within 20 kilometers of Deseret Chemical Depot. No changes were made to the protocol.

23. **Comment.** The HRA/PP needs to include an assessment of the total non-local impact of TOCDF emissions of dioxin-like compounds together with existing levels and continuing emissions of such air pollutants from all regional air pollution sources, particularly in light of recent findings in a report by the National Research Council (NRC) that concluded that regional atmospheric transport of persistent organic pollutants from air pollution sources is causing contamination at levels of concern.

Response. The comment does not provide a specific reference. The health risk assessment is being conducted in accordance with U.S. EPA methods (referenced as U.S. EPA 1998b in the draft protocol). Also, please see response to Kentucky Environmental Foundation comment 22.

24. **Comment.** The TOCDF HRA/PP needs to provide a mass balance analysis, accounting for all of the toxic emissions from TOCDF in terms of their ultimate long term fate and public health and environmental consequences.

Response. The health risk assessment is being conducted in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol) which does not recommend a mass balance analysis be conducted. However, a mass balance analysis is conducted indirectly during the quantitative risk assessment by accounting for the total organic emission rate in the uncertainty section of the risk assessment (a measure of the fraction of the total organic emissions that have been quantitatively evaluated); by various over-estimations inherent in the use of the ISCST3 air modeling program due to double-counting for different types of deposition; and by mass balance violations (over-estimations) in several of the fate and transport equations used. These various measures result in an overall over-estimation of the amount of COPCs to which each receptor is exposed while allowing the user to compensate for the fraction of organic compounds that cannot be identified during the stack gas testing process.

25. **Comment.** The criticisms posed by the recent testimony and disclosures of former TOCDF permit coordinator Gary Harris need to be addressed in the HRA/PP including adequate provision for local consumption of locally produced beef, dairy products and vegetables.

Response. The DSHW interviewed Mr. Harris and local residents during preparation of the *Screening Risk Assessment* (A.T. Kearney, 1996). Mr. Harris's claims during his depositions in 1999 and 2000 regarding the health risk assessment were considered. The DSHW has interviewed local residents and reviewed court transcripts regarding consumption of local foods. Fruit trees do not commonly produce because of frosts that can occur in any month (1997 was first year in 20 that apples were produced). Above ground gardens are limited to cold tolerant vegetables or those vegetables with a short growing season (tomato's require greenhouse). Below ground vegetables are common. People in the vicinity of Deseret Chemical Depot raise dairy goats but presently there is no known human consumption of the milk. Other domestic stock identified are geese, chickens, ducks, turkeys, sheep, rams, horses, pigs, buffalo, and beef cattle. Many of these stock are fed commercial feed. Goat, sheep, horses, buffalo, and cattle consume

locally produced feed. The health risk assessment describes in Section 4.0 the evaluated exposure pathways for homegrown beef, pork, poultry, eggs, dairy, fruits, and vegetables.

26. **Comment.** The criticisms posed by the recent testimony and disclosures of former TOCDF permit coordinator Gary Harris need to be addressed in the HRA/PP including assessment of impacts on employees who spend 60 hours or more a week on site at the Depot.

Response. The DSHW is investigating work schedules at Deseret Chemical Depot. If credible evidence is available that workers could be exposed on average for more than eight hours per day, 250 days per year, for 25 years, the U.S. EPA default exposure parameters may be modified.

27. **Comment.** The risk characterization and uncertainties sections of the HRA/PP need to be centered around and focused on the precautionary principle. If the evidence indicates a reasonable possibility that harm to human health or the environment may occur from TOCDF emissions, either based on calculations based on known factors or truly conservative assessment of unknown factors, then the burden of proof must be placed on the owner and operator of the pollution source and facility should fail the HRA. As an example, if there is a scientific basis for believing that certain types of potentially toxic chemicals may be emitted in the TOCDF stack gas as products of incomplete combustion and those chemicals have not been identified or the toxicity of the chemicals have not been identified, then the UDEQ must prohibit operation of TOCDF until all such emissions have been identified and until the toxicity data has been obtained. Unknowns cannot be assumed to be harmless. If a facility operator does not know the chemicals being fed into an incinerator and/or does not know the chemicals coming out, the facility should fail the HRA and be denied a permit to operate.

Response. The comment advocates an approach that is not consistent with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol) or Utah Hazardous Waste Management Rules. The risk characterization will be conducted in accordance with U.S. EPA recommendations (referenced as U.S. EPA 1998b in the draft protocol). The final step of a risk assessment is the calculation of the uper-bound excess lifetime cancer risks (risk) and noncarcinogenic hazards (hazard) for each of the pathways and receptors identified (referenced as U.S. EPA 1998b in the draft protocol). A qualitative uncertainty analysis will be conducted in accordance with U.S. EPA recommendations (referenced as U.S. EPA 1998b in the draft protocol).

28. **Comment.** The HRA/PP in the uncertainty section or perhaps more appropriately in the main body of the HRA/PP needs to quantitatively as well as qualitatively address unknown or uncertain factors by use of mathematical uncertainty factors of sufficient size and in a manner that allows a mathematical bounding of the risk estimate on the bottom and top. If this cannot be done, or if the range of potential risks thus bounded exceeds an acceptable risk standard, then the facility should fail the HRA and be denied a permit to operate.

Response. This comment and response are similar to the previous Kentucky Environmental Foundation comment 27. The methodology recommended by the U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) is anticipated to overstate the potential health risks and hazards (that is, an estimate of the upper bound of risk) with the lower bound estimate of risk and hazard estimates being zero.

APPENDIX G-5

RESPONSES TO COMMENTS FROM DEPARTMENT OF THE ARMY CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM

(Four Pages)

RESPONSES TO COMMENTS FROM THE DEPARTMENT OF ARMY CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM

Comments were submitted to DSHW on November 8, 2000, by Mr. Greg Hansen, U.S. Army Chemical Agent Munitions Disposal System, Deseret Chemical Depot, Tooele County, Utah.

1. **Comment.** Abbreviations and Acronyms, Page ix. ACAMS stands for Automatic Continuous Air Monitoring System.

Response. The definition of ACAMS has been revised accordingly.

2. **Comment.** Abbreviations and Acronyms, Page ix. ACWA stands for Assembled Chemical Weapons Assessment.

Response. The definition of ACWA has been revised accordingly.

3. **Comment.** Abbreviations and Acronyms, Page ix. AWCO should be AWFCO.

Response. The acronym has been corrected.

4. **Comment.** Abbreviations and Acronyms, Page xi. Place "methyl ethyl ketone" in parentheses after "2-butanone."

Response. The definition of MEK has been revised as suggested.

5. **Comment.** Section 2.1.2, 3rd paragraph, Page 6. "Constructed" should be "began operations."

Response. Section 2.1.2 has been revised in accordance with the comment.

6. **Comment.** Section 2.1.3.2, 2nd paragraph, Page 8. Please clarify this paragraph to better describe the June 26, 1996 Compliance Order. The two RD&D permits were for conducting in-situ hydrolysis of VX in ton containers and for MDC2 operation. The Compliance Order cover letter stated that the RD&D permits allowed "performance of a ton container heel test and operation of the Material Decontamination Chamber 2." The "ton container heel test" referred to the VX hydrolysis, not treatment in the MPF. The main purposes of the 1996 Compliance Order were to revoke the 1991 RD&D Permit, to require CAMDS to submit a Part B Permit application, and to allow operation of the facility with limited operating conditions until a Part B Permit was issued. (See Compliance Order 9602009.)

Response. Section 2.1.3.2 has been revised to clarify the purpose and basis of the June 26, 1996, Compliance Order.

7. **Comment.** Section 2.1.3.2, 3rd paragraph, Page 8. Please clarify this paragraph to better describe the September 3, 1998 Compliance Order. This replaced the 1996 Compliance Order. The cover letter to the 1998 Compliance Order stated that it was needed "to allow for offsite management of spent decontamination solution and to refine operating parameters for treatment units at the CAMDS site." It set a deadline for submittal of information to fill data gaps in the Part B Permit application. This information was not from further MPF testing and operation. (See Compliance Order 9808018.)

Response. Section 2.1.3.2 has been revised to clarify the purpose and basis of the September 3, 1998, Compliance Order.

8. **Comment.** Section 2.1.3.2, 2nd paragraph, Page 8. The Part B application was not just submitted for the incinerators. It also included tank hazardous waste storage, container hazardous waste storage, treatment of munitions in various demil machines and Subpart X units, and treatment of spent decontamination solutions and pollution abatement system brines in tanks and dryer units.

Response. Section 2.1.3.2 has been revised to incorporate this information.

9. **Comment.** Section 2.1.3.2, 4th paragraph, 1st sentence, Page 8. "Alternative" should be "assembled." ACWA did not have anything to do with the Lewisite Neutralization System Permit.

Response. Section 2.1.3.2 has been revised in accordance with the comment.

10. **Comment.** Section 2.1.3.2, 4th paragraph, last sentence, Page 8. "Continuously" should be "continuous."

Response. The grammar has been revised in accordance with the comment.

11. **Comment.** Section 2.1.3.3, 2nd paragraph, Pages 9-10. CAMDS has its own permit, issued September 1999, which covers the CAMDS site storage areas and 4104 and 4105 in Area 2. The DCD Permit no longer applies to CAMDS.

Response. Section 2.1.3.3 has been revised in accordance with the comment.

12. **Comment.** Section 2.1.3.3, 2nd paragraph, Page 10. The Toxic Dunnage Incinerator was removed. The area is now called the Material Treatment Facility. The list of CAMDS permitted storage areas is incomplete. Please revise this list based on Attachment 12 in the 1999 CAMDS Part B Permit.

Response. Section 2.1.3.3 has been revised in accordance with the comment.

13. **Comment.** Table 2-5, Page16. Feed rates from the 1991 RD&D Permit are listed. The proposed rates from the DFS Modification submitted in December 1999 (DSHW Tracking Number 99.04869) should be used. See the DSHW copy of the modification. The feed rates in the mod are also listed in the Attachment following this comment table.

Response. We disagree. The feed rates referenced in the comment are currently proposed and have not been tested nor incorporated into the CAMDS permit. Based upon a preliminary review of the old and new limits, only minor variations exist. Once a trial burn test has been completed at the new limits, the actual emission rates will be compared to the surrogate rates to ensure that emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated.

14. **Comment.** Section 2.2.2.3, 3rd paragraph, 3rd sentence, Page 33. This sentence states that the CAMDS DFS HD data is not considered to be "trial burn test quality." Why is this? Please explain.

Response. The CAMDS DFS HD compliance test is not considered to be trial burn test quality by DSHW due to a lack of regulatory agency personnel oversight. Section 2.2.2.3 of the draft protocol has been revised to clearly indicate this reasoning.

15. **Comment.** Section 2.2.2.4, 1st paragraph, last sentence, Page 34. This states that the CAMDS HVAC system consists of nine separate stacks used to emit the off-gas from the filters. The correct number of filter stacks is 11.

Response. The text has been revised in accordance with the comment.

16. **Comment.** After Section 2.2.2.4, Table 2-14, in subsection 2.4.3, Pages 34, 58, and 77. CAMDS would like to add the Brine Dryers as a point source of emissions to be considered in the risk assessment. However, there is no stack gas emission data available for the current configuration of the Brine Dryers Whirlwet pollution abatement system. This data will be provided after a compliance test is performed. CAMDS requests that no other data be substituted in the interim. In accordance with the Part B Permit, the dryers will not be used to treat hazardous waste until a compliance test has been performed by CAMDS and approved by the DSHW.

Response. Due to (1) a lack of trial burn test data for these units and (2) the absence of a similar (as defined by U.S. EPA guidance) unit at TOCDF or JACADS, emission rate extrapolation is not possible. Once a compliance test has been completed for this unit, the actual emission rates will be used to update the risk assessment as necessary. Section 2.2.2 of the draft protocol has been revised accordingly.

17. **Comment.** Section 2.0, Table 2-14, Page 58. For DFS GB feed rate extrapolation, table states: *CAMDS DFS not in existing Part B permit; cannot extrapolate based on feed rate*

This table should use information contained in DFS Part B Permit modification submitted in December 1999 to DSHW. (See Comment 12.)

Response. We disagree. The feed rates referenced in the comment are currently proposed and have not been tested nor incorporated into the CAMDS permit. Based upon a preliminary review of the old and new limits, only minor variations exist. Once a trial burn test has been completed for the new limits, the actual emission rates will be compared to the surrogate rates to ensure that the emission rates used to complete this risk assessment are equal to or greater than the actual test results. If necessary, the risk assessment will be updated.

18. **Comment.** Section 2.4.5.3, 3rd paragraph, Page 84. Default process upset factors recommended by the EPA were applied to CAMDS emission rates because "no site-specific data were available." The assumption that for organic compounds CAMDS would operate as measured during a trial burn for only 80 percent of the year and under upset conditions for 20 percent of the year seems too high. Also, the assumption is 95 percent and 5 percent for metals. Why the large difference?

Response. Default upset factors were applied in accordance with current U.S. EPA guidance. The derivation of these factors originated from studies performed by the California Air Resources Board in 1990. The guidance does not specify the basis for the different values recommended.

19. **Comment.** Section 4.1.1, 4th paragraph, 3rd sentence, Page 101. The sentence states that most of the agricultural areas near DCD are located north and northeast of DCD near St. John. It should be "north and northwest."

Response. The text has been revised in accordance with the comment.

20. **Comment.** Section 7.1, last sentence, Page 132. "Appendix C" should be "Appendix D."

Response. Section 7.1 has been revised in accordance with the comment

APPENDIX G-6

RESPONSES TO COMMENTS FROM THE SIERRA CLUB

(Three Pages)

RESPONSES TO COMMENTS FROM THE SIERRA CLUB

Written comments were submitted to DSHW on November 8, 2000, by Ms. Cindy King, Utah Chapter of the Sierra Club, 2273 South Highland Drive, Suite 2D, Salt Lake City, Utah 84106-2832

1. **Comment.** The protocols for the Health Risk Assessment were lacking in the following areas: (1) My organization believes that the Division is mistaken in their assumption that there is no statutory and/or regulatory requirement for public participation. For example: Title 42 of the Public Health and Welfare section 6974 states, in part: "Public participation in the development, revision, implementation and enforcement of any regulation, guideline, information or program under this chapter shall be provided for and encouraged, and assisted by the Administrator and the States..." The Health Risk Assessment will establish data for the acceptable emission rates; ergo, establish guidelines for this statutory requirement. Also, the Utah Appeals Court encouraged public participation for Health Risk Assessment. Merely claiming that the public is mostly concerned with the implementation of the Health Risk Assessment and not the protocols is another fallacy of the Division.

Response. Some DSHW regulatory activities, such as permit modifications, have explicit rules for public participation. If permit limits are changed (that is, a permit modification), the modification is open to public comment. The Utah Administrative Code Hazardous Waste Management Rules do not have specific requirements for public participation for the health risk assessment. However, the DSHW has addressed the intent of the comment by soliciting and responding to public comments for the health risk assessment. No changes were made to the protocol.

2. **Comment.** (2) The protocols were to establish acceptable emission rates for dioxin-like compounds; none were available. The Division's claims that there is no standard is a fallacy. The Utah Appeals Court decision stated that if any United States agency has established a standard and/or a policy for dioxin-like compounds, that standard and/or policy must be used. As early as 1984 there has been an acceptable policy developed and incorporated into the most recent EPA dioxin-like compounds document and the 1994 document on dioxin-like compounds. The reason that the Health Risk Assessment is not using this acceptable policy for standards on dioxin-like compounds is merely a lack of the Division's veracity.

Response. The health risk assessment is one of the tools that the Division uses to evaluate the RCRA operating permit conditions and the potential to impact human health. The health risk assessment evaluates the emission rates of dioxin-like compounds but does not establish acceptable emission rates for dioxins (that is, there is no acceptable dioxin emission rates identified in the RCRA operating permit). The DSHW presumes that the comment references the Utah Court of Appeals Case No. 971313-CA (reference is attached). The Utah Court of Appeals in footnote 4 stated “Thus, for instance, should the EPA arrive at a dioxin reference dose for infants, the Division would presumably incorporate the appropriate analysis in a risk assessment.” The potential health effects from exposure to 2,3,7,8-substituted chlorinated dioxins or furans are evaluated using cancer as an endpoint in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). A reference dose is required to evaluate the potential for noncancer effects. The comment cites EPA documents from 1984 and 1994, that would have been available to the Utah Court of Appeals. The court noted “Moreover, the Board hears testimony that the EPA did not recommend using one of the reference doses proposed by the Sierra Club and that, just as there are more conservative breast-milk ingestion models, like those asserted by the Sierra Club, there are also more liberal models.”

With regards to a U.S. EPA approved reference dose (that is, listed in the Integrated Risk Information System [IRIS] or Health Effects Summary Database [HEAST]) for 2,3,7,8-substituted chlorinated dioxins or furans), none is available. The U.S. EPA National Center for Environmental Assessment (NCEA) recommends interim toxicity values for chemicals not in IRIS or HEAST. NCEA does not recommend the use of the 1 pg/kg-day as a reference dose for 2,3,7,8-tetrachlorodibenzo(p)dioxin. There have been no substantive changes in U.S. EPA guidance for evaluating the potential for noncancer health effects from dioxin-like chemicals since the *Screening Risk Assessment* (ATK, 1996). No revisions were made to the protocol.

3. **Comment.** (3) Data that came from CAMDS and JACADS cannot be used as an internal extrapolation for TOCDF; this is because there is no single compound being released at any given time to make the internal extrapolation.

Response. The health risk assessment protocol estimated emissions when site- and waste-specific emissions data were not available. The estimates were based on emissions data from similar facilities that treat similar waste in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). This procedure facilitates decision-making prior to a facility committing resources for a process that may not receive the requisite regulatory approval. The methods used for extrapolating emission rates for the health risk assessment protocol are intended not to underestimate actual emissions. This assumption will be verified with actual trial burns and the health risk assessment updated as warranted. Additional detail has been added to the protocol in Section 2.4.2 to clarify the sources of emissions data.

4. **Comment.** (4) There is no protocol for full heels, which are currently allowed at TOCDF; ergo, the determination of acceptable risk to any of the scenarios cannot be determined. The data from both CAMDS and JACADS clearly determined that 5% or less heel would be processed.

Response. This comment has been interpreted to question the representativeness of the trial burn emissions data for the TOCDF. The health risk assessment emission rates will be based on the trial burns. Therefore, the trial burn emissions should not underestimate the long-term average emissions. The DSHW disagrees that the GB trial burn emissions may underestimate the emissions from the treatment of munitions with greater than five percent heel at the TOCDF. Permitted furnace feed rates, successfully demonstrated during the trial burns, are based upon the number of munition units (for instance, 33 rockets per hour) and waste mass per unit time (17 pounds of GB per hour). Various sections of the draft protocol have been revised to clarify how emissions estimates were derived.

5. **Comment.** (5) Time, temperature and turbulence all are necessary to assure combustion; there is no protocol for co-processing from projectiles and rockets. The Division claims that co-processing is based on the total amount of agent assuming only five percent heel. The issue of heels being in incremental rate as they are being feed into the furnace (e.g., a number of projectiles to that of rockets) has not been resolved. This could mean that heels could be between 5% to 100% with no way of stopping the feed to remove the excess allowed heels before processing.

Response. The DSHW disagrees that the coprocessing of projectile components and rockets in the TOCDF deactivation furnace has not been resolved. GB that is drained from rockets or projectiles is processed in the liquid incinerators. The remainder of the rocket, and sometimes undrained rockets, are processed in the deactivation furnace. For explosively configured projectiles, the burster (only) is processed in the deactivation furnace. The metal bodies of the projectiles are processed in the metal parts furnace. The concern of excess GB feed to the

deactivation furnace from co-processing undrained rockets and projectile bursters is unfounded. The projectile bursters do not have a GB component, that is, the bursters are not contaminated with GB. The burster feed rate to the deactivation furnace is limited by the permitted explosives and propellents feed rate. Undrained rockets have the same amount of propellant and explosive as drained rockets, so co-processing is not impacted by undrained rockets. In practice, there is an impact because the amount of explosive and propellant from rockets is less (on an hourly basis) when full rockets are processed because the GB feed rate becomes the limiting condition. No changes to the protocol were made. Also see response to Sierra Club comment 5.

6. **Comment.** (6) The upset protocols have not taken into account actual data, like March 30, 1998, incident where there was 512 times exceedence released. The upset protocol for the Health Risk Assessment assumes that the facility will be in upset condition between 5 to 20% of the time (i.e., the difference is whether the upset is for metals or organics). This protocol does not take into account the ACAMS alarm rate. Ergo, the issue here is not necessarily whether ACAMS are confirmed or not, but whether they are alarming. The alarming conditions means that it is an upset condition.

Response. The comment incorrectly states that the health risk assessment protocol has not included the GB-overfeed to the TOCDF metal parts furnace on March 30, 1998 in the evaluation of upsets. The protocol estimates the percentage of time that the TOCDF operates in upset based on data collected in 1998, including March 30. The 5 and 20 percent values are default values from U.S. EPA (referenced as U.S. EPA 1998b in the draft protocol) guidance that were <u>not</u> applied to the TOCDF because in accordance with the guidance, site-specific data is available. The time that the TOCDF operates in upset condition is limited by the waste-feed cutoffs required by the RCRA permit, that is, the TOCDF is not permitted to process waste while the furnaces are in an upset condition. ACAMS are not designed to evaluate upset conditions and are not reliable for such a task. Depending on the type and quantity of products-of-incomplete-combustion , an ACAMS may alarm during an upset condition. The data collected by the ACAMS will not identify the chemical or quantity unless the chemical is GB (or other chemical agent for which the instrument is configured) and may or may not alarm. Also see Families Against Incinerator Risk comment 10. No changes to the protocol were made.

APPENDIX G-7

ATTACHMENT
UTAH COURT OF APPEALS OPINION

(15 Pages)

IN THE UTAH COURT OF APPEALS

OPINION
(For Official Publication)

----ooOoo----

Sierra Club, Chemical Weapons Working Group,
and Vietnam Veterans of America Foundation,

Petitioners,

v.

Utah Solid and Hazardous Waste Control Board,

Respondent,

and

United States Army and EG&G Defense Materials, Inc.,

Intervenors.

Case No. 971313-CA

F I L E D

(August 20, 1998)

Original Proceeding in this Court

Attorneys: Mick G. Harrison, Berea, Kentucky, for Petitioners

Jan Graham, Laura Lockhart, and Raymond Wixom, Salt Lake City, for Respondent

Alan D. Greenberg and Robert H. Foster, Denver,

Colorado, for Intervenor United States Army

David W. Tunderman and Craig D. Galli, Salt Lake City, for Intervenor EG&G Defense Materials, Inc.

Before Judges Davis, Wilkins, and Orme.

ORME, Judge:

Sierra Club, Chemical Weapons Working Group, and Vietnam Veterans of America Foundation (collectively referred to herein as Sierra Club) petition this court for review of a final order of the Utah Solid and Hazardous Waste Control Board pertaining to the Tooele Chemical Agent Demilitarization Facility (referred to by the parties and herein as TOCDF) located at the Deseret Chemical Depot, formerly known as Tooele Army Depot South. We decline to disturb the Board's order.

FACTS

The Deseret Chemical Depot is one of eight sites in the continental United States housing the nation's chemical weapons stockpile. The country's entire stockpile consists of approximately 30,000 tons of chemical agent. Housed at the Depot is over two-fifths of the stockpile--more than 13,000 tons. These chemicals include the nerve agents GB (sarin) and VX, and the blister agents H, HD, and HT (mustard gas). The chemicals are contained in weapons, such as rockets, artillery shells, bombs, and mines, and in one-ton storage devices called "ton containers." The Army stores these materials at Tooele in earth-covered magazines called "igloos," in fenced storage yards, and in warehouses.

The risk from continued storage of these agents has been a matter of long-standing concern. In 1989, the Board's Executive Secretary approved the Army's hazardous waste plan for construction of a hazardous waste treatment facility to destroy the chemical weapons stockpiled at the Depot. The Executive Secretary issued the authorizing permit only to the Depot, although the United States Army, TOCDF's owner, had contracted with EG&G Defense Materials, Inc. to operate TOCDF, and EG&G began doing so in 1993.

In July 1993, the Army completed construction of TOCDF, which is comprised of five separate incinerators: two liquid incinerators used to burn liquid agent that has been drained from munitions and bulk containers; a Deactivation Furnace System used to incinerate munitions that have been drained of agent but are still contaminated; a Metal Parts Furnace used to decontaminate metal parts that have been drained of agent; and a Dunnage Incinerator used to burn non-agent contaminated and agent contaminated dunnage, such as pallets and spent carbon filters.

Before TOCDF operations could begin, the permit and federal and state law required the Army to conduct a series of "trial burns" to ensure that the facility could operate safely. In late 1995, the Army submitted trial burn plans to the Executive Secretary for approval. After requiring the Army to conduct surrogate trial burns with surrogate chemicals, in June 1996 the Executive Secretary approved the trial burn plans for the liquid incinerators and the Deactivation Furnace System. The Army scheduled four trial burns for these incinerators: a "shakedown" burn with no chemical agent, an "R & D" burn with no agent, a shakedown burn with chemical agent, and a

"demonstration" burn with chemical agent. In August 1996, TOCDF began the shakedown burn with chemical agent.

In conjunction with trial burn approval, the State Division of Environmental Quality, through a contractor, conducted a Screening Health Risk Assessment (SRA) which analyzed the expected effects of theoretically high TOCDF emissions on human health and the environment. The Division conducted the SRA to address two primary concerns: whether TOCDF emissions would cause cancer and whether they would cause other types of illness. The SRA, following United States Environmental Protection Agency (EPA) guidelines, examined the potential exposure to six hypothetical groups living downwind of TOCDF: adults and children residing at the point of maximum emissions, three types of farmers, and subsistence fishermen. The Division incorporated conservative assumptions into the SRA, such as calculating the risks from exposure for up to thirty years of TOCDF emissions even though TOCDF is expected to operate for only seven years. The Division found, inter alia, that the overall cancer risks from dioxin exposure do not exceed EPA guidance levels for ten, fifteen, and thirty year operating periods. The SRA did not calculate the noncancer effects of dioxin exposure because the EPA has not adopted a reference dose for dioxin.

AGENCY DISPOSITION

In June 1996, the Executive Secretary granted the Army's request to modify the permit by adding intervenor EG&G as a permittee and operator of TOCDF. This modification prompted Sierra Club to file its First Request for Agency Action on July 18, 1996, in which it asked the Board to withdraw its modification of the permit which authorized EG&G to be a permittee and operator of TOCDF. Sierra Club subsequently filed a Second Request for Agency Action on July 22, 1996, in which it attacked the Executive Secretary's June 1996 approval of the agent trial burn plans for the liquid incinerators and the Deactivation Control Furnace. In its second request, Sierra Club claimed that TOCDF cannot be operated safely and that respondents failed to demonstrate compliance with legal requirements for hazardous waste incineration. Sierra Club therefore sought reversal of the Executive Secretary's approval of the trial burns and a Board order enjoining respondents from beginning any chemical incineration at TOCDF.

The Board held a hearing on Sierra Club's requests on March 18-20 and April 17, 1997. The Board ordered that Sierra Club would have twelve hours to present its case, the Army and EG&G would collectively have ten hours, and the Executive Secretary would have five hours. On April 17, the Board orally denied Sierra Club's two requests and issued its written order on July 22, 1997. Sierra Club then filed with this court a petition for review of the Board's order denying its two requests for agency action. The Army and EG&G subsequently intervened in this proceeding.

ISSUES

Sierra Club raises three principal arguments.[(1)] First, Sierra Club contends that the Board erred in failing to terminate or revoke the TOCDF permit in the face of evidence of substantial noncompliance with the Utah Solid and Hazardous Waste Act and endangerment to human health and the environment. Second, Sierra Club argues that the Board erred in allowing EG&G

to operate TOCDF because EG&G is unable to operate the facility safely and in compliance with law. Third, Sierra Club contends that the Board violated its procedural Due Process rights by unreasonably limiting Sierra Club's time to present evidence and to cross- examine witnesses at the hearing. The Board, in addition to responding to Sierra Club's allegations, argues that Sierra Club lacks standing to petition this court for review. We first address the Board's standing argument.

STANDING

The Board argues that, although Sierra Club's standing was not considered below,[(2)] Sierra Club has failed to demonstrate that it has standing to petition this court for review because it cannot meet any of the three recognized standing criteria. The Board's argument is unpersuasive, and we conclude that Sierra Club has standing to petition this court for review because it raises issues of significant public importance.

"[A] plaintiff may maintain a suit against governmental action in those limited circumstances in which a case raises issues that are so 'unique and of such great importance that they ought to be decided in furtherance of the public interest.'" National Parks & Conservation Ass'n v. Board of State Lands, 869 P.2d 909, 913 (Utah 1993) (quoting Terracor v. Utah Bd. of State Lands, 716 P.2d 796, 799 (Utah 1986)). Under this standard, "[t]he dispute must (1) raise a statutory or constitutional issue of substantial public import, (2) be presented by adverse parties, and (3) otherwise be suitable for resolution by the courts." Id.

In Sierra Club v. Department of Environmental Quality, 857 P.2d 982 (Utah Ct. App. 1993) (Sierra Club I), a somewhat similar case involving Sierra Club's challenge to an operating permit for a Tooele County commercial hazardous waste incinerator, we raised sua sponte Sierra Club's lack of standing and dismissed its petition for review. See id. at 983. In Sierra Club I, Sierra Club took issue with the Executive Secretary's approval of the operation-plan application for the incinerator. See id. at 984. Specifically, Sierra Club alleged that the applicant failed to provide evidence that emergency response plans had been coordinated with emergency personnel and that the application was otherwise incomplete. See id. Sierra Club alleged that these two errors in the application-approval process impaired its members' enjoyment of Western Utah because the incinerator, once it began operating, would generate pollution. See id. at 986.

In addition to concluding that Sierra Club lacked standing on two other asserted grounds, we held that it failed to raise any issues of significant public importance:

> Sierra Club is challenging determinations by the Board that constitute internal procedural decisions preceding any public involvement in the permit process. The issues, at this stage, are not of great public importance and it is not in the public interest to seek review of the Board's internal operating procedures.

Id. at 987.

The same cannot be said of the present case. In contrast to Sierra Club I, in this case the Executive Secretary has approved trial burns with chemical agents, the Army has conducted such burns since August 1996, and the Board has fielded public comment. Sierra Club also alleges several violations of Utah law, challenges the Division's and the Army's safety assessment measures upon which burn approvals were based, and identifies specific accidents at TOCDF

involving actual chemical agent. Sierra Club's arguments are therefore of great public importance and their resolution is inarguably in the public interest.

TOCDF is a matter of significantly greater public concern, both locally and nationally, than was the permit prematurely challenged in Sierra Club I. TOCDF is the first facility of its kind in the continental United States, and it processes some of the deadliest substances on earth in relatively close proximity to a major metropolitan area. Consequently, the safety of TOCDF operations, which will continue for seven years, are of undeniably significant public importance.

Our Supreme Court's ruling in National Parks & Conservation Ass'n v. Board of State Lands, 869 P.2d 909 (Utah 1993), strongly supports our conclusion that the issues raised by Sierra Club are of substantial public concern. National Parks dealt with a proposed land swap and development within Capitol Reef National Park and along the Burr Trail. See id. at 913. The National Parks and Conservation Association (NPCA) challenged the proposal and the Utah Supreme Court ultimately held that NPCA had standing because it raised issues of significant public importance. See id. at 913-14. Those issues included the State's discharge of its fiduciary duties in administering school trust lands and in preserving scenic, recreational, archaeological, and paleontological values related to those lands. See id. In comparing the issues in National Parks to those Sierra Club raises in this case--namely, allegedly substantial risks to human health and safety--the issues in this case clearly qualify as issues of significant public importance.

We conclude that Sierra Club has standing to petition this court for review. Given our conclusion, we need not address the alternative bases for standing.

NONCOMPLIANCE WITH UTAH LAW & ENDANGERMENT TO HUMAN HEALTH & THE ENVIRONMENT

Sierra Club first argues that the Board erred in failing to terminate or revoke the TOCDF permit in light of evidence of substantial noncompliance with the Utah Solid and Hazardous Waste Act and evidence that TOCDF emissions endanger human health and the environment.

Standard of Review

In its opening brief, Sierra Club contends that its petition challenges the Board's factual findings and therefore its claims should be reviewed under the "substantial evidence" standard of review. The Board argues that Sierra Club failed to marshal the evidence, as is required for challenges to fact findings. In its reply brief and at oral argument, Sierra Club restated its position, claiming it is not challenging the Board's findings of fact but is instead challenging the Board's allegedly erroneous application of law to fact. In light of Sierra Club's clarification of its position, we necessarily accept the Board's factual findings as uncontested and therefore address only the Board's application of the law to the uncontested facts.

When a petitioner challenges an agency's application of law to fact, we apply a standard of review that is not static, but is instead determined on a sliding scale: "[An] agency's application of the law to the facts may, depending on the issue, be reviewed by an appellate court 'with varying degrees of strictness, falling anywhere between a review for "correctness" and a broad "abuse of discretion" standard.'" Drake v. Industrial Comm'n, 939 P.2d 177, 181 (Utah 1997) (quoting Langeland v. Monarch Motors, Inc., 307 Utah Adv. Rep. 3, 4 (Utah 1996), withdrawn,

952 P.2d 1058 (Utah 1998)). See State v. Pena, 869 P.2d 932, 937-939 (Utah 1994). Thus, in deciding upon the level of discretion we accord to the agency in such situations, we consider "factors such as policy concerns and an agency's expertise." Drake, 939 P.2d at 181 n.6.

The present case involves highly technical, specialized scientific knowledge which is uniquely within the Board's expertise. Cf. Professional Staff Management, Inc. v. Department of Employment Sec., 953 P.2d 76, 79 (Utah Ct. App. 1998) (concluding that court would review agency decision with only moderate deference because applying relevant law required little specialized knowledge uniquely within agency's expertise); Allen v. Department of Employment Sec., 781 P.2d 888, 890 n.4 (Utah Ct. App. 1989) (same). We therefore accord the Board a relatively high degree of deference in reviewing its application of the law to the facts in this case.

Analysis

Sierra Club contends that the trial burns with agent present a hazard to human health or the environment, and therefore the Board should have revoked TOCDF's trial burn permit. The applicable rule provides:

The Executive Secretary shall approve a trial burn plan if it finds that:

(i) The trial burn is likely to determine whether the incinerator performance standard . . . can be met;

(ii) The trial burn itself will not present an imminent hazard to human health or the environment;

(iii) The trial burn will help the Executive Secretary to determine operating requirements to be specified . . .; and

(iv) The information sought . . . cannot reasonably be developed through other means.

Utah Admin. Code R315-3-20(b)(5) (Supp. 1997). Sierra Club therefore challenges the second of the four criteria which must be satisfied before the Executive Secretary may approve a trial burn plan. More specifically, Sierra Club uses the SRA's alleged deficiencies to attack the subsequent trial burn approvals. Sierra Club's opening brief takes a shotgun approach to this issue, an approach Sierra Club refined at oral argument by limiting its challenge to the SRA's inadequacy in four discrete areas: (1) dioxin risk to infants from TOCDF emissions; (2) effects of TOCDF emissions on consumers of locally produced dairy products; (3) effects of open burning/open detonation emissions when combined with TOCDF stack emissions; and (4) effects of mustard gas emissions from the stack that ventilates the waste handling areas (HVAC stack).

a. Dioxin Risk to Infants

Sierra Club contends that the SRA failed to address two concerns relating to the risk to infants from TOCDF dioxin emissions: the actual level of infant dioxin exposure from TOCDF emissions and the safe level of infant dioxin exposure from TOCDF emissions. Specifically, Sierra Club argues that in an early draft of the SRA, the Division calculated that the dioxin exposure risk to subsistence farmers' breast-fed infants was over fifty times greater than the acceptable dose. Sierra Club claims that after reaching this conclusion, the Division then deleted this data from the SRA, rather than further addressing this dioxin risk to subsistence farmers' breast-fed infants. Sierra Club therefore maintains that the Division violated its affirmative duty to protect the public by omitting this data from the SRA. Sierra Club asks this court, at a

minimum, to remand these issues to the Board for it to determine the actual and acceptable dioxin risks to breast-fed infants.

Given the deference we owe the Board's decision, we reject Sierra Club's allegations that TOCDF trial burn operations present an unacceptable dioxin exposure risk to nursing infants and that the Division should have addressed this risk in the SRA. Several considerations support this conclusion.

First, we note that there is considerable debate in the scientific community concerning safe levels of dioxin exposure and therefore the fact that Sierra Club can point to some studies suggesting an unacceptably high dioxin risk is not determinative, especially given the conflicting testimony before the Board. Given the level of debate over safe dioxin dosage, the Division's omission of analysis concerning breast-fed infant dioxin exposure is not unreasonable. The Board was in no way misled. It heard testimony that such an analysis was not included in the SRA because no reference dose for breast-fed infants has been generally accepted and that omitting analysis in the absence of a reference dose accords with EPA guidance and is standard practice for risk assessments of the type conducted here. Moreover, the Board heard testimony that the EPA did not recommend using one of the reference doses proposed by Sierra Club and that, just as there are conservative breast-milk ingestion models, like those asserted by Sierra Club, there are also more liberal models.

Second, Sierra Club did not present the Board with credible evidence that any deficiencies in the SRA pointed up imminent hazards to human health or the environment as a result of trial burn operations. More specifically, what is at issue here is not the health risk from full long-term operation of TOCDF--the only type of operation the SRA addressed--but rather the risk from the preliminary trial burns, which must be conducted before the Executive Secretary can approve full operation of TOCDF. In other words, despite the fact that the SRA's outlook was ten, fifteen, and thirty years of operation, Sierra Club wishes to translate possible dioxin risk from such long-term operation to the relatively short-term trial burns at issue here. Moreover, Sierra Club's argument is contrary to testimony by an expert to the effect that when the SRA dioxin calculations are applied to the shorter term trial burn period, the results indicate no appreciable risk to human health.

Additionally, Sierra Club bases its dioxin arguments largely upon the SRA which, by its very nature, was never intended to provide accurate, specific numbers regarding actual TOCDF operations. The expert explained that the purpose of a screening risk assessment is to "provide a conservative estimate of the possible risk of health hazards posed by chemical emissions from a facility" and that "conservative" means the assessment includes "numerous assumptions or calculation procedures that result in a broad margin of safety between the calculated risk estimate . . . and the likely risk to human health." In other words, the assessment makes assumptions that "intentionally overstat[e] what is known to be true." Because of this broad safety margin, it is not appropriate to interpret the assessment's risk estimates as "true" or "absolute." Instead, a screening risk assessment "is a method for determining plausible upper limits of risk, not actual probability or risk of harm." If the assessment, given all the conservative worst-case assumptions, shows that there is no risk, no further study is required. Conversely, if the assessment indicates that a potential risk exists, more refined and specific analysis is

conducted.

The Division's SRA incorporated a number of conservative assumptions. For example, it addressed operating periods not only much longer than the trial burns at issue here, but also much longer than TOCDF's expected operating life; the SRA assumed that TOCDF would emit all seventeen toxic types of dioxin even though this would not be the case, see Chemical Weapons Working Group, Inc. v. United States Dep't of the Army, 935 F. Supp. 1206, 1213 (D. Utah 1996), aff'd, 111 F.3d 1485 (10th Cir. 1997), and it assumed simultaneous full-scale operation of all the incinerators, around-the-clock, for 365 days per year.

Thus, considering the scientific debate over dioxin exposure, and the SRA's long-term focus and conservative assumptions, Sierra Club failed to present any persuasive evidence that dioxin emissions from TOCDF trial burn operations present an imminent hazard to human health or the environment. Thus, given the evidence before the Board and the deference we accord it, we see no error in the Board's decision in this regard.[(3)]

b. Local Dairy Products

Sierra Club also contends that the Division omitted from the SRA the effects of TOCDF emissions on consumers of locally produced dairy products. Sierra Club argues that because the risk estimate for nonsubsistence farmers fell right at the State/EPA acceptable level, if the SRA risk estimate had included local dairy consumption, the cancer risk estimate would have necessarily exceeded the State and EPA standards. Sierra Club further alleges that an EG&G survey showed that a local dairy producer actually existed but wished to remain anonymous, and that the Division therefore improperly omitted any local dairy analysis from the SRA. Sierra Club contends that the Division should have subpoenaed EG&G's source, verified the existence of the local dairy producer, and included local dairy analysis in the SRA. In response, the Army argues that the Division surveyed local farming practices and did not locate anyone consuming locally produced milk.

We conclude that the Board acted within its sound discretion in rejecting Sierra Club's arguments concerning the omission of dairy products from the SRA. We note that Sierra Club presented no witnesses who engaged in, or knew of anyone who engaged in, dairy farming in TOCDF's vicinity. We therefore agree with the statement of the United States District Court for the District of Utah in rejecting a similar argument in an associated case: "Although . . . the assumptions applied in the [SRA] may indicate a higher level of risk for some hypothetical persons, this does not constitute a showing that there is an actual risk to some person or persons posed by the emissions levels predicted for [TOCDF]." Chemical Weapons Working Group, 935 F. Supp. at 1214. Sierra Club failed to present to the Board any strong evidence that any local dairy producers existed.

While Sierra Club did not present evidence of local dairy production, the Board heard testimony that the Division could not find any individuals who were milking for 100% of their own consumption or for sale to neighbors; that some residents had milked in the past but were no longer doing so; that commercial dairy operations in the area were not feasible; and that the document which allegedly shows the Division knew of local dairy consumption was not prepared by the Division and was viewed by it as a "rough draft or a place to start as far as . . . inquiry into the [local dairy] practices in Rush Valley."

Moreover, many of the same observations we made regarding infant dioxin risk also apply here, particularly the limited nexus between the short trial burn period and the SRA and the SRA's

inherently conservative assumptions. In view of the foregoing, we conclude that the Board did not err in rejecting Sierra Club's dairy consumption arguments.

c. Open Burning/Open Detonation & Mustard Emissions

Sierra Club argues the Division failed to address in the SRA the effects of open burning/open detonation of chemical weapons and that the cumulative effect of open burning/open detonation and TOCDF emissions would exceed the State/EPA standard. We note that the Division has prohibited open burning/open detonation until a risk assessment modeling the risks of such activity is conducted and the risks are shown to be acceptable. Moreover, the Board heard testimony that if such an assessment indicated that the cumulative effect of open burning/open detonation and TOCDF emissions presented a risk, the Division would not permit open burning/open detonation while TOCDF is operating. The Board therefore clearly acted within its discretion in rejecting Sierra Club's argument because any risks associated with open burning/open detonation are not yet imminent.

Sierra Club also contends that the SRA is flawed because it fails to adequately address the effect of mustard gas emissions from the stack that ventilates the waste handling areas (HVAC stack). Specifically, Sierra Club contends that the Division arbitrarily lowered the estimated mustard emissions from the HVAC stack after that estimate showed a high risk from such emissions. As is the case with open burning/open detonation, the Executive Secretary has not yet approved mustard agent incineration. Consequently, the Board did not err in rejecting Sierra Club's arguments concerning these matters.

OMISSION OF EG&G FROM PERMIT, ACCIDENTS AT TOCDF

Sierra Club contends that the Board erred in refusing to revoke EG&G's permit to operate TOCDF. Specifically, Sierra Club argues that the Board should have revoked EG&G's permit in light of EG&G's permitless operation of TOCDF for six months in violation of the Utah Solid and Hazardous Waste Act, specifically Utah Code Ann. 19-6-108(3)(a) (Supp. 1997),[(4)] and in light of alleged accidents at TOCDF while the facility was under EG&G's control. Sierra Club further asserts that the Executive Secretary erred in adding EG&G to the permit in June 1996. In response, the Board and intervenors contend that the Executive Secretary reasonably interpreted section 19-6-108(3)(a) in concluding that hazardous waste facilities frequently employ contractors and subcontractors and that EG&G's status as a contractor for the Army does not mean that EG&G was an "operator" within the statute's meaning. Therefore, they argue, EG&G did not need a permit and the Executive Secretary's later decision to add EG&G to the permit, though not legally required, was a reasonable exercise of his discretion.

Standard of Review

Whether EG&G is an "operator" within the meaning of section 19-6-108(3)(a)--and therefore required to obtain a permit--is an issue of statutory construction. "We review the agency's statutory construction as a question of law under a correction-of-error standard unless the statute expressly or impliedly grants the agency discretion to interpret the statutory language." Epperson v. Utah State Retirement Bd., 949 P.2d 779, 781 (Utah Ct. App. 1997). See O'Keefe v. Utah State Retirement Bd., 929 P.2d 1112, 1114 (Utah Ct. App. 1996), aff'd on other grounds, 956 P.2d 279 (Utah 1998); Allred v. Utah State Retirement Bd., 914 P.2d 1172, 1174 (Utah Ct. App. 1996). In this case, the Solid and Hazardous Waste Act does not grant the Board such discretion,

and therefore we review its decision for correctness. See generally Epperson, 949 P.2d at 781; O'Keefe, 929 P.2d at 1115. "Under the correction-of-error standard, this court affords no deference to the agency's interpretation or application of statutory terms." Allred, 914 P.2d at 1174.

Whether the Board erred in refusing to revoke EG&G's permit in light of accidents and mishaps at TOCDF involves the Board's application of law to fact, see Drake v. Industrial Comm'n, 939 P.2d 177, 181 & n.6 (Utah 1997); State v. Pena, 869 P.2d 932, 937-939 (Utah 1994), subject to the intermediate standard of review we discussed above. For essentially the same reasons as those previously discussed, we accord the Board a relatively high degree of deference in reviewing its application of law to the facts of this case.

Analysis

The statute at issue provides: "No person may own, construct, modify, or operate any facility or site for the purpose of . . . treating, storing, or disposing of hazardous waste without first submitting and receiving the approval of the executive secretary for a . . . hazardous waste operation plan for that facility or site." Utah Code Ann. 19-6-108(3)(a) (Supp. 1997). See also Utah Admin. Code R315-3-1(a) (Supp. 1997) ("No person shall own, construct, modify, or operate any facility for the purpose of treating, storing, or disposing of hazardous waste without first submitting, and receiving the approval of the Executive Secretary for, a hazardous waste operation plan for that facility."). Thus, the issue is relatively straight-forward: Did EG&G "operate" TOCDF within the statute's meaning? If so, section 19-6-108(3)(a) required EG&G to have a permit.[(5)]

"When interpreting statutes, [an appellate] court is guided by the long-standing rule that a statute should be construed according to its plain language. Thus, where the statutory language is plain and unambiguous, [the court] will not look beyond it to divine legislative intent." Utah Sign, Inc. v. Utah Dep't of Transp., 896 P.2d 632, 633-34 (Utah 1995) (citations omitted). Accord Brinkerhoff v. Forsyth, 779 P.2d 685, 686 (Utah 1989); Epperson, 949 P.2d at 782. See also Johnson v. Utah State Retirement Bd., 770 P.2d 93, 95 (Utah 1988) ("A fundamental principle of statutory construction is that unambiguous language in the statute itself may not be interpreted so as to contradict its plain meaning.").

Even though the Executive Secretary conceded that EG&G is an operator of TOCDF, and even though the intervenors refer in their brief to EG&G as an operator of TOCDF, the Board and the intervenors contend that EG&G is somehow not an operator within the statute's meaning because EG&G is a contractor hired by the Army. They further contend that the Army is the only party required to hold a permit because the Army bears "ultimate responsibility for construction and operation of the facility."

"[T]he terms of a statute should be interpreted in accord with their usual and accepted meanings." Clover v. Snowbird Ski Resort, 808 P.2d 1037, 1045 (Utah 1991). Accord Mt. Olympus Waters, Inc. v. Utah State Tax Comm'n, 877 P.2d 1271, 1273 (Utah Ct. App.) (presuming statutory terms are used in their ordinary sense and should be interpreted according to usual and commonly accepted meanings), cert. denied, 890 P.2d 1034 (Utah 1994). Section 19-6-108(3)(a) uses the term "operate," which, as conceded by the Executive Secretary and the intervenors, encompasses the services EG&G performs at TOCDF. EG&G "operates" that facility under the common meaning of the term, regardless of whether it does so as a contractor,

a partner, a joint venturer, or a volunteer. The Board and intervenors would have us construe "operate" to somehow exclude contractors hired by owners, even if they are hired--as is the case here--to "operate" the owner's facility. Such a construction does not accord with the plain meaning of the statute, nor with the "usual and accepted" meaning of the term "operate." If the Legislature intended that permits be obtained by only those "bearing ultimate responsibility for construction and operation" of hazardous waste facilities, as the intervenors assert, the statute would not require parties that "construct, modify, or operate" hazardous waste facilities to obtain a permit, in addition to those who "own" such facilities. It is inarguable, given the statute's plain language, that EG&G violated section 19-6-108(3)(a) by operating TOCDF without a permit, and the Board erred in concluding that EG&G did not need a permit.

Sierra Club contends that because EG&G violated the Solid and Hazardous Waste Act by operating TOCDF without a permit, the Board should have sanctioned EG&G by refusing to add them to the permit. However, it appears that EG&G's omission from the permit was largely due to the Executive Secretary's erroneous interpretation of the term "operate," not to any connivance or evasion by EG&G. The fact that the Executive Secretary eventually added EG&G to the permit indicates that he came to realize the potential problem and took appropriate corrective action. Because the problem has been corrected, we cannot say the Board was unreasonable in declining to punish EG&G for not being named in the permit earlier by barring it from being included in the permit now.

As a second ground for seeking revocation of EG&G's permit, Sierra Club claims that a series of "mishaps, accidents, and violations"[(6)] at TOCDF show that EG&G cannot operate the facility in an acceptably safe manner. The Solid and Hazardous Waste Act provides that "[a]pproval of a . . . hazardous waste operation plan may be revoked, in whole or in part, if the person to whom approval of the plan has been given fails to comply with that plan." Utah Code Ann. 19-6-108(12) (Supp. 1997) (emphasis added). Permit revocation is therefore a matter within the Board's discretion and is by no means mandatory. Here, while it found that accidents had occurred at TOCDF, the Board also found that the Army and EG&G took corrective steps after each mishap and that none of the incidents have recurred.

Sierra Club does not dispute that the Army and EG&G have taken such corrective measures. Moreover, these accidents occurred during what is known as the "shakedown" period--the central purpose of which is to "identify possible mechanical difficulties, ensure that [TOCDF] has reached operational readiness and achieve steady-state operating conditions prior to conducting the trial burns." One of the purposes of this phase of TOCDF operations is therefore to shake out possible bugs before the facility begins full-scale operations. Based on the foregoing, we cannot say that the Board abused its discretion or otherwise erred in refusing to revoke EG&G's permit due to these operational mishaps.

DENIAL OF DUE PROCESS RIGHTS

In a prehearing order dated September 19, 1996, about six months before the hearing began, the Board ordered that Sierra Club would be given twelve hours to argue and conduct direct and cross-examination before the Board; EG&G and the Army would be limited to a collective total of ten hours; and the Executive Secretary would be limited to five hours.

Sierra Club argues that the Board violated its state and federal procedural Due Process rights[(7)] by unreasonably limiting its time to present its case and cross-examine adverse witnesses.[(8)] Intervenors and respondent contend that Sierra Club was afforded ample opportunity to present its case and to cross-examine witnesses, but that Sierra Club failed to efficiently use its allotted time and failed to exploit the available opportunities for otherwise getting evidence before the Board.

Standard of Review

"Questions regarding whether an administrative agency has afforded a petitioner due process in its hearings are questions of law. We therefore do not give deference to the agency's actions." Lopez v. Career Serv. Review Bd., 834 P.2d 568, 571 (Utah Ct. App.), cert. denied, 843 P.2d 1042 (Utah 1992).

Analysis

"The requirements of due process depend upon the specific context in which they are applied because 'unlike some legal rules due process is not a technical conception with a fixed content unrelated to time, place, and circumstances.'" V-1 Oil Co. v. Department of Envtl. Quality, 939 P.2d 1192, 1196 (Utah 1997) (quoting Cafeteria Workers Union v. McElroy, 367 U.S. 886, 895, 81 S. Ct. 1743, 1748 (1961)). Due Process is therefore "flexible and requires such procedural protections as the particular situation demands." Worrall v. Ogden City Fire Dep't, 616 P.2d 598, 602 (Utah 1980).

We conclude that under the circumstances of this case, the Board did not deny Due Process to Sierra Club. The Utah Administrative Procedures Act (APA) provides that "[t]he presiding officer [of an administrative hearing] shall regulate the course of the hearing to obtain full disclosure of relevant facts and to afford all the parties reasonable opportunity to present their positions." Utah Code Ann. 63-46b-8(1)(a) (1997). The APA further provides that "[t]he presiding officer shall afford to all parties the opportunity to present evidence, argue, respond, conduct cross-examination, and submit rebuttal evidence." Id. 63-46b-8(1)(d).

While the Board's time limitations do appear somewhat parsimonious, under the APA the Board was entitled to regulate the course of the hearing, which necessarily included its duration. Here, the Board limited every party's time, with Sierra Club receiving the largest block of all. Sierra Club knew of the time limits far in advance of the actual hearing date yet failed to object until the hearing was well underway. The Board also offered the parties numerous opportunities to present their positions in forms other than through time-consuming testimony, i.e., pre- and post-hearing briefs, affidavits, deposition transcripts, transcripts from a companion case in federal court, and witness diaries.

Moreover, when it became apparent that Sierra Club had used the vast bulk of its time presenting its case and therefore had little time left for cross-examination of witnesses, the Board granted forty-five minutes of extra time to Sierra Club, and both the Army and the Executive Secretary ceded Sierra Club part of their allotted times. Finally, the Board permitted Sierra Club to take additional, unlogged time on cross-examination and voir dire of several witnesses. All told, Sierra Club used over fifteen hours by the end of the proceeding. The Executive Secretary used one hour and the Army and EG&G collectively used less than nine hours.

In support of its contention that, due to the time limits imposed by the Board, Sierra Club was denied its Due Process right to cross-examine adverse witnesses, Sierra Club primarily relies on two Utah cases where agencies violated the right to cross-examine witnesses. See Tolman v. Salt Lake County Attorney, 818 P.2d 23 (Utah Ct. App. 1991); D.B. v. Division of Occupational & Prof'l Licensing, 779 P.2d 1145 (Utah Ct. App. 1989). These cases are readily distinguishable from the one before us.

In Tolman, the petitioner argued that he was denied Due Process when the agency admitted highly prejudicial hearsay testimony, testimony which petitioner could not challenge without cross-examining the declarant, who did not testify. See 818 P.2d at 28-29. In D.B., the administrative law judge refused to permit the petitioner to cross-examine any of the three witnesses presented against him. See 779 P.2d at 1147. We found denials of Due Process in both cases because these petitioners were denied any right to cross-examine the witnesses at issue. Such was not the case here.

In this case, the Board subjected Sierra Club to a time limit, not an outright denial of its right to cross-examine specific witnesses. "An administrative agency has broad discretion to reasonably regulate the time periods afforded parties to present evidence." Clark v. Board of Dirs., 915 S.W.2d 766, 773 (Mo. Ct. App. 1996). See also Childs v. Copper Valley Elec. Ass'n, 860 P.2d 1184, 1190 (Alaska 1993) (stating review board "may place reasonable time limits on testimony in order to manage its own docket"). The fact that Sierra Club ran short on time does not mean it was denied its constitutional right to cross-examine witnesses, as occurred in Tolman and D.B. The right to Due Process in an agency hearing does not translate into an absolute right to take as much time in presenting its case as a participant desires.

A further distinction between this case and those cited by Sierra Club is that in both Tolman and D.B., the petitioners showed they suffered substantial prejudice from these outright denials of the right to cross-examine. D.B., 779 P.2d at 1149; Tolman, 818 P.2d at 30-31. Sierra Club does not make such a showing here. Aside from generally alleging that it lacked time to cross-examine several witnesses, Sierra Club does not state what evidence it needed to get in but did not, nor does it show that the case would have come out differently had it been given more time.

Moreover, it appears from the record that any shortfall in cross-examination time was partially due to Sierra Club's failure to budget its time. "'All parties [to an agency hearing] . . . must be given opportunity to cross-examine witnesses, to inspect documents and to offer evidence in explanation or rebuttal.'" D.B., 779 P.2d at 1146 (emphasis added) (quoting State Dep't of Community Affairs v. Utah Merit Sys. Council, 614 P.2d 1259, 1262 (Utah 1980)). Here Sierra Club had the opportunity to cross-examine every witness--it merely failed to make the most of that opportunity through judicious use of its allotted time.

Based on the foregoing, we conclude that the Board's time limitations were not unreasonable and that Sierra Club was not denied its constitutional rights to Due Process.

CONCLUSION

We first conclude that Sierra Club has standing to bring this appeal because the issues raised are matters of substantial public importance. Second, we conclude that the Board did not err in

refusing to revoke the trial burn permit in the face of Sierra Club's allegations of hazards to human health and the environment. Third, we conclude that the Board erred in finding that EG&G was not an "operator" of TOCDF under Utah Code Ann. 19-6-108(3)(a) (Supp. 1997), but that the Board did not abuse its discretion in refusing to revoke EG&G's permit on that basis. Additionally, we conclude the Board acted within its discretion in refusing to revoke EG&G's permit based on the accidents which have occurred at TOCDF. Fourth, we conclude that Sierra Club was not denied its federal and state Due Process rights by the time limits imposed by the Board.

Accordingly, we decline to disturb the Board's order.

_____

Gregory K. Orme, Judge

WE CONCUR:

_____

James Z. Davis,

Presiding Judge

_____

Michael J. Wilkins,

Associate Presiding Judge

1. At oral argument, counsel for Sierra Club acknowledged that he had not moved for pro hac vice admission before this court, reasoning that he had so moved before the agency below. Technically, the case here is not an appeal but an original proceeding in this court. See generally Utah Code Ann. 63-46b-16(1) (1997); Utah R. App. P. 3(c), 14(a). Counsel for Sierra Club should therefore have moved for pro hac vice admission in this proceeding. Rule 40(d) of the Utah Rules of Appellate Procedure provides as much: "An attorney who is licensed to practice before the bar of another state or a foreign country but who is not a member of the Bar of this state, may appear, upon motion, pro hac vice." Although counsel for Sierra Club failed to comply with this requirement, we nonetheless suspend the rule for the convenience of the opposing parties and the court. Despite this suspension, counsel is directed to comply with Rule 40(d) in the future.

2. "Either party, or the court on its own motion, may properly raise the issue of standing for the first time on appeal." Wade v. Burke, 800 P.2d 1106, 1108 (Utah Ct. App.), cert. denied, 800 P.2d 1105 (Utah 1990). Accord Terracor v. Utah Bd. of State Lands, 716 P.2d 796, 798 (Utah 1986) (stating that appeals court can address standing issue sua sponte); Sierra Club v. Department of Envtl. Quality, 857 P.2d 982, 984 (Utah Ct. App. 1993) (same).

3. This is not to say, of course, that the actual and acceptable levels of infant dioxin exposure are not appropriate topics of future study by the Division before the Board approves full operations at TOCDF. In fact, a Division employee testified that the Division will do future assessments and update already-conducted assessments as appropriate, thereby incorporating new data and any new EPA guidance. Thus, for instance, should the EPA arrive at a dioxin reference dose for infants, the Division would presumably incorporate the appropriate analysis in a risk assessment.

4. As a convenience to the reader, and because the provisions in effect at the relevant times do not differ materially from the statutory provisions currently in effect, we cite to the most recent statutory codifications throughout this opinion, unless otherwise noted.

5. We follow the parties' lead in using "permit" synonymously with the statutory phrase "receiving the approval of the executive secretary for a . . . hazardous waste operation plan."

6. Specifically, Sierra Club alleges that an employee of an EG&G subcontractor provided falsified trial burn data; that nerve agent leaked into permeable vestibules outside the HVAC filters; that nerve agent decontamination solution leaked through an airlock; that fires have occurred in the liquid incinerator area; and that EG&G workers are inadequately trained.

7. Because "Utah's constitutional guarantee of due process is substantially the same as the due process guarantees contained in the Fifth and Fourteenth amendments to the United States Constitution," In re Worthen, 926 P.2d 853, 876 (Utah 1996), we need not undertake separate federal and state analysis.

8. During the hearing, Sierra Club also objected to the Board's decision to charge Board members' questions against the parties' allotted time.